Invest Work 4

p30-31

11/5

1. a Mountains form when 2 plates converge
   buckle upwards

   b. I believe that volcanoe are formed when plates diverge and magma and forms new land

   when converge for all

   c. Yes the plates cause earthquakes when they "transform" and rub against each. and push into them

11/8

Procedural Adjustments

Tape cereal Box to table
Tape left cardboard to cereal box
Mark off 2.5 cm marks
Push only right side (Not Both)

11/9

3. I think the shaving cream will be pushed up like a mountain

Pic:  I think this because the model represents what actully happens I believe

Do it

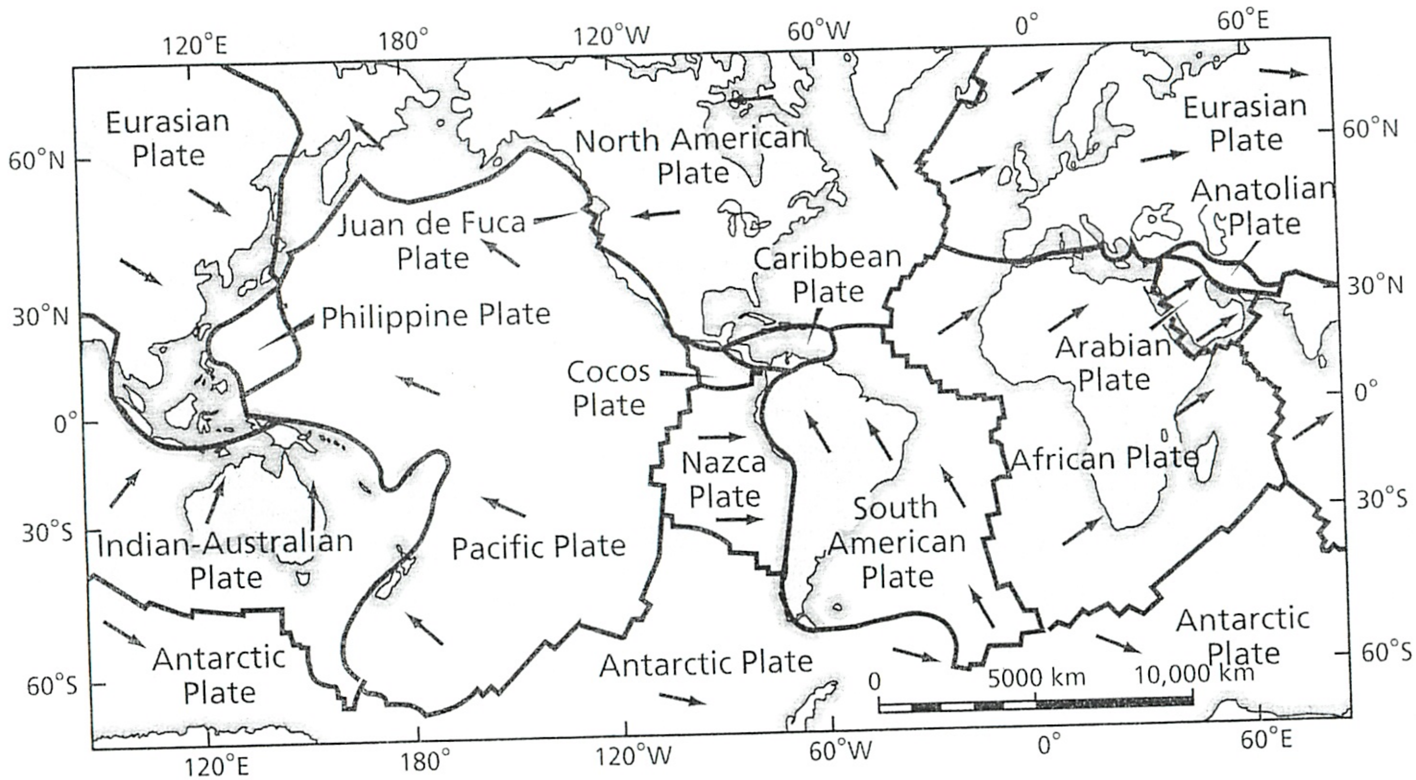
4.

	Drawing	Hight (cm)	With
2.5 (start)		.3	12.5
5 (After 1 move)		1	16
7.5		1.25	8
10		1.5	6
12.5		1.6	3.5
15		2	1.5
17.5		2.5	1.5
20		2.5	1.5

5. The shaving cream went up onto the moving cardbord

5c. Almost the same. It bunched up more and after it went up it did not move

Relative Motion of Major Lithospheric Plates



Invest 4

Map Work

11/10

6a. Jan de Fuga (-) North American
Antolian → Eurisan
South American → Caribian
Pacfic Plate → Indian - Australian
Indian - Australian + Eurasian + Pacific Plate → Phillppine Plate

Only ocanian to contentel

Best Nazca (ocean) → South American (Contental)

b. In both the model and real converging plates the material in between (shaving cream, crust/rock) get pushed upwards to form a mountain.

c. They would be where their is a high plate movement.

Earthquakes are caused when 1 plate goes under another (subduction)

d. They would occure where their ~~are~~ plates move. where the arrows show
- California
- Ring of Fire
- Phillppines (West Asia

Contental plates move much easier over oceanic plates than other contental plates

Subduction usually occures w/ oceanatic & contental

Invest 4
Digging Deeper

1. Difference Between Crust + Lithosphere.

The lithosphere is what makes up the crust and does not convect even though it is hot enough include part of the mantle. The crust is the upper part of the lithosphere is it is totally solid : confusing

2. Differese between oceanavic + continentalcrust.

Oceanic crust is much thinner as it where mid ~~ocean~~ ridges occure. It then gets thicker but not as thick as conental crust

Difference between subduction + contental collision

3. Subduction zones occure when the ocean crust goes under the contental crust. Contental crust collision is when the contents push up to form mountains

4. contents not go down in subduction zones

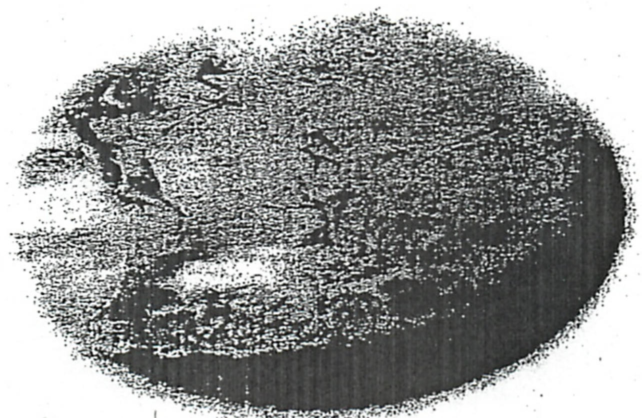
Contents dont go down in subducton zones because they are too dense to be forced downwoards.

51

Invest 5

Earthquakes, Volcanos, + Mountains

Student Journal Cover Sheet
Investigating Our Dynamic Planet



Name: Michael Plasmeier

Group Members:

1. Suillaan Vaceer
2. Mellisa McCarty
3. Merdith O'Neill
4.

Teacher: D'Andra

Class:

Dates of Investigation:

Start 11/16 Complete

Investigation 5
Earthquakes, Volcanoes, and Mountains
Background Information

In this investigation you will plot the locations of earthquakes, volcanoes, and major mountain ranges on a world map. You will then search for patterns and relationships between these three events or features, and compare the locations of these features to a map of major plate boundaries. You will then conduct further research about these events and features and present your maps and findings to the class.

In the **Digging Deeper** reading section you will learn about the nature of earthquakes, the relationship between earthquakes and plate movement, the nature of volcanoes, the relationship between volcanoes and plate movements, the association of earthquakes and volcanoes, and the nature of mountain building.

At the conclusion of this investigation, you will develop a better understanding of the causes of earthquakes, volcanoes, and mountain building in relation to plate tectonics.

Key Question

How are Earthquakes, Mountains + Volcanoes Relate

They are all related because they are all formed by lithosperic plates

Data Sheet
Invest 5

11/14

1.a No, it needs lava under neath it. Formed 2 diff ways

Content-content goes mountain
Subduction zone forms volcanos

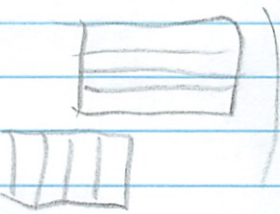
b. No, always is a hard word to prove and volcanos can form in the middle plates

c. ~~Sort of~~, are there little earthquakes when it errups
(No) always as above formed 2 diff ways
Extreamly rare

11/17

2.a latitude = is flatitud

b longitude = is long



pick point on Earth

c Depth = distance down

d Magnitude = Strength

5.a New Guine, Equador, Japan, Western (Eastern) Russia, Meddrian Sea

b. Mid-Ocean Ridge, China, Western USA, Oceania

c. Earth Quakes + Volcons are around same spots, edges of contonts and islands

d. Plate Boundrys + Volcanic - Created Islands

#7 a Equador, Eastern (Westrn) Russia, Mediteran Sea, Peru

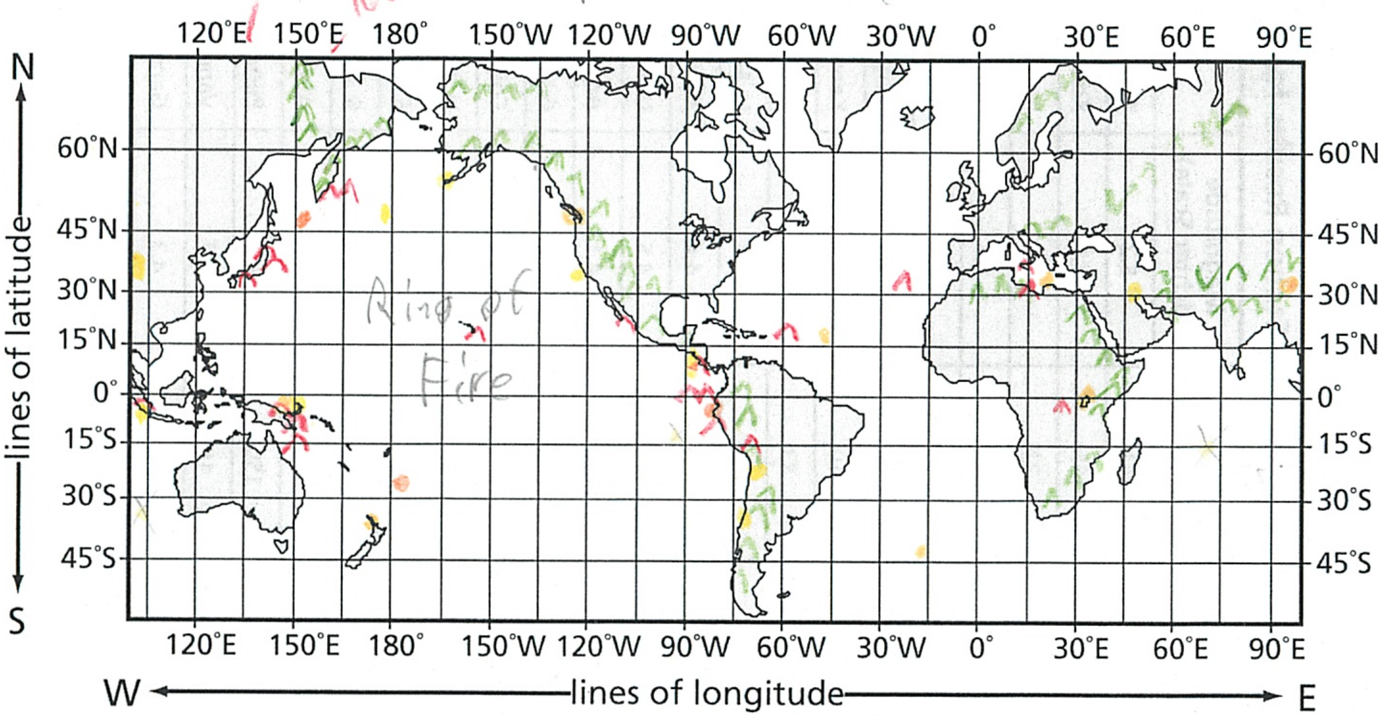
b. Andez Moutains, Hawii, Mid-Ocean Ridges, Himillas

c. They are all along plate boundaries and are created from the plates moving, though they are all formed different ways

Blackline Master *Our Dynamic Planet* 5.1

World Map

Use with *Our Dynamic Planet* Investigation 5: Earthquakes, Volcanoes, and Mountains



Earthquakes
● = 4.0 - 4.5
● = 4.6 - 4.9
● = 5.0 - 5.6

= Volcanos

: Mountains

54

Blackline Master *Our Dynamic Planet* 5.2

Seismograph Station Results for Five Days

Table 1: Subset of Seismograph Station Results for One Week

Latitude	Longitude	Depth (kilometers)	Magnitude (Richter Scale)	Occurrence Region
47°N	151°E	141	5.2	Kuril Islands
28°S	178°W	155	5.0	Kermadec Islands
30°N	52°E	33	4.2	Iran
36°N	140°E	69	4.7	Honshu, Japan
34°N	103°E	33	4.3	Gansu, China
40°S	177°E	27	4.8	New Zealand
0°N	36°E	10	4.6	Kenya, Africa
38°N	21°E	33	4.6	Ionian Sea
16°N	47°W	10	4.7	N. Mid-Atlantic Ridge
6°S	147°E	100	4.4	New Guinea
55°N	164°W	150	4.5	Unimak Island, Alaska
24°S	67°W	176	4.1	Argentina
13°N	91°W	33	4.2	Guatemala coast
4°N	76°W	171	5.6	Colombia
40°N	125°W	2	4.5	N. California coast
5°S	102°E	33	4.4	S. Sumatra, Indonesia
44°S	16°W	10	4.6	S. Mid-Atlantic Ridge
51°N	179°E	33	4.4	Aleutian Islands
15°S	71°W	150	4.2	Peru
49°N	128°W	10	4.7	Vancouver, Canada
35°N	103°E	33	4.3	Gansu, China

Use with *Our Dynamic Planet* Investigation 5: Earthquakes, Volcanoes, and Mountains

Blackline Master *Our Dynamic Planet* 5.3

Table 2: Global Volcanic Activity Over One-Month Period

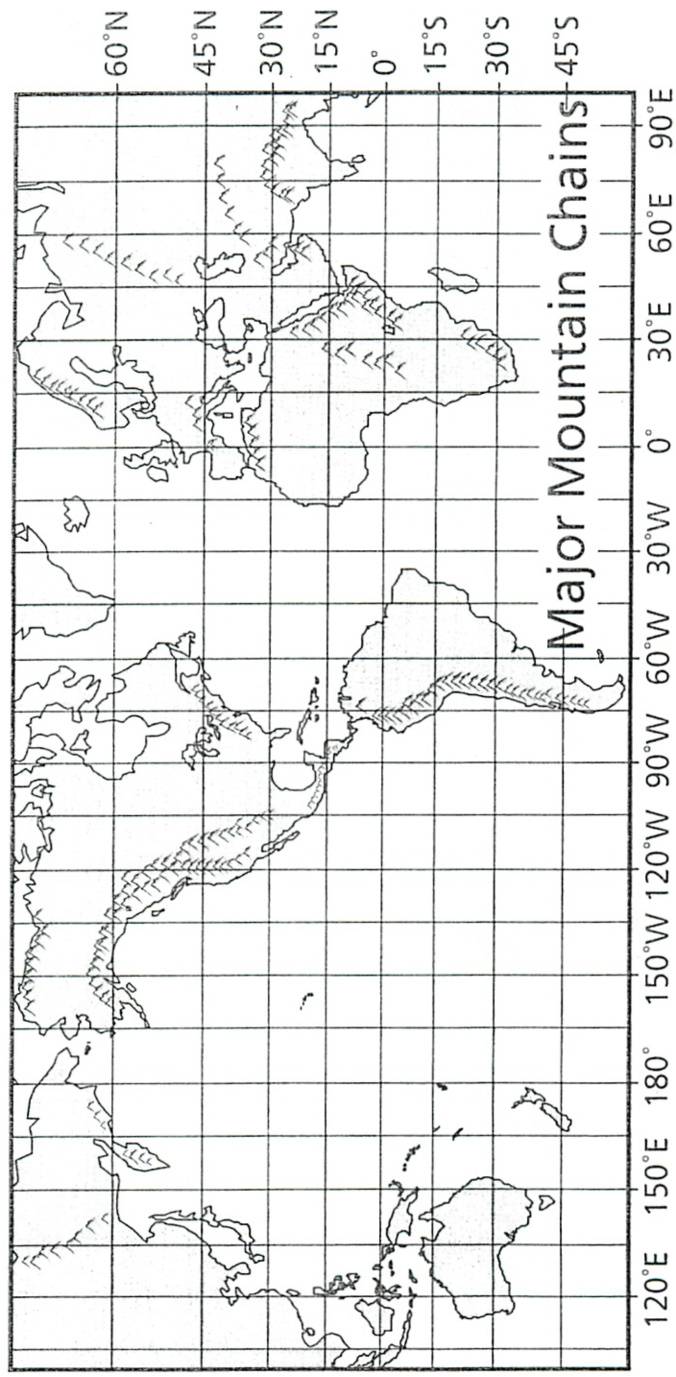
Table 2: Global Volcanic Activity Over One-Month Period

Latitude	Longitude	Location	Region
1°S	29°E	Nyamuragira	Congo, Eastern Africa
38°N	15°E	Stromboli	Aeolian Islands, Italy
37°N	15°E	Etna	Sicily, Italy
15°S	71°W	Sabancaya	Peru
0°	78°W	Guagua Pichincha	Ecuador
12°N	87°W	San Cristobal	Nicaragua
0°	91°W	Cerro Azul	Galapagos, Ecuador
19°N	103°W	Colima	Western Mexico
19°N	155°W	Kilauea	Hawaii, USA
56°N	161°E	Shiveluch	Kamchatka, Russia
54°N	159°E	Karymsky	Kamchatka, Russia
43°N	144°E	Akan	Hokkaido, Japan
39°N	141°E	Iwate	Honshu, Japan
42°N	140°E	Komaga-take	Hokkaido, Japan
1°S	101°E	Kerinci	Sumatra, Indonesia
4°S	145°E	Manam	Papua, New Guinea
5°S	148°E	Langila	Papua, New Guinea
15°S	167°E	Aoba	Vanuatu
16°N	62°W	Soufriere Hills	Montserrat, West Indies
12°N	86°W	Masaya	Nicaragua
37°N	25°W	Sete Cidades	Azores

Use with *Our Dynamic Planet* Investigation 5: Earthquakes, Volcanoes, and Mountains

Blackline Master *Our Dynamic Planet* 5.4

Major World Mountain Chains



Use with *Our Dynamic Planet* Investigation 5: Earthquakes, Volcanoes, and Mountains

Invest 5

Michael Plasmeier Digging Deeper 12/1

1. What is the cause of an Earthquake?

Earthquakes are caused by the built up pressure of the plates transforming or moving along each other. The pressure that builds up is too much and the pressure gets released.

2. How are faults and earthquakes related?

Faults and earthquakes are related in the ways that are described above. Faults are places where plates are transforming.

3. What is the cause of Volcanos?

The gasses in volcanos force up the magma to explode out

4. How does gas content affect Volcanos

They have different ways of eruption. Low gas cause it to come out violently then flows peacefully. High gas comes with powerful explosion which cause hugh chunks to sail through the air.

5. How are hot-spot + ridge volcanos diffrent + same

Ridges are formed as the plates collide. Ridges are holes in the crust that when the plates move the whole moves and forms more volcans. They are similar because they are formed as lava makes its way up and out the crust.

6. Why are mountains formed where lithosphere is thick.

Mountains form when lithosphere plates colide. When they colide they push up so big plates form big mountains

Invest 6

Earth's Moving Continents (Pangea)

Key Qu

Have the continents and oceans alwas been in the same place as they are today?

No, they once were toghlter as Pangea and we learned it in 6th grade, They moved apart slowly over the years.

Dinasour bones found half way accross world when they can't swim

Oceans changed w/ erosion + glaser meltings

Plates moved on astosphere

6

Investigation 6: Earth's Moving Continents
Background Information

Do you think that the continents and oceans have always been in the same place that they are today? This question challenges you to think about the "permanence" of continents and ocean basins, and is the focus of Investigation 6: Earth's Moving Continents.

In this investigation, you will explore the evidence needed to evaluate whether or not continents and oceans have moved over time. You will examine the fit of the continents across the Atlantic ocean, the patterns of mountain belts, evidence from fossils, and evidence from glaciers to reconstruct what the Earth's continents and oceans looked like 250 million years ago.

You will review the theory of continental drift, the concept of supercontinents, (including Pangea), and the breakup of Pangea. In effect, this investigation challenges you to relate the events you have studied (the causes and locations of earthquakes, volcanoes, and mountains) to evidence for a scientific theory that explains the occurrence of these events and features of the Earth.

Inves 6
Data sheet

12/6

1.a The costs fit into each other so mabey they were once together.

b. They also fit together like 1a.

3. The overlaps in 1a, 1b where North + South Amercia met Africa, Europe (spain) fit in the Caribion, Antartic fit in the Indian Sea. Greenland fit above N. America + Europe Australia fit by antartica and pactic Island's

1b Very confident because we learned before

4a. 3's are all in the same reigon. 5 forms a long stip down. 2's + 1's are sort of toghter

b. It supports it c. No changes Nessary

5b+d Strengthen because I can arrage Austrlia, India, Antartica

6b The lines do conect Some what, But Australia does not fit

7a More Info on Antartica

Pangea

My thought

Michael Plasmeier

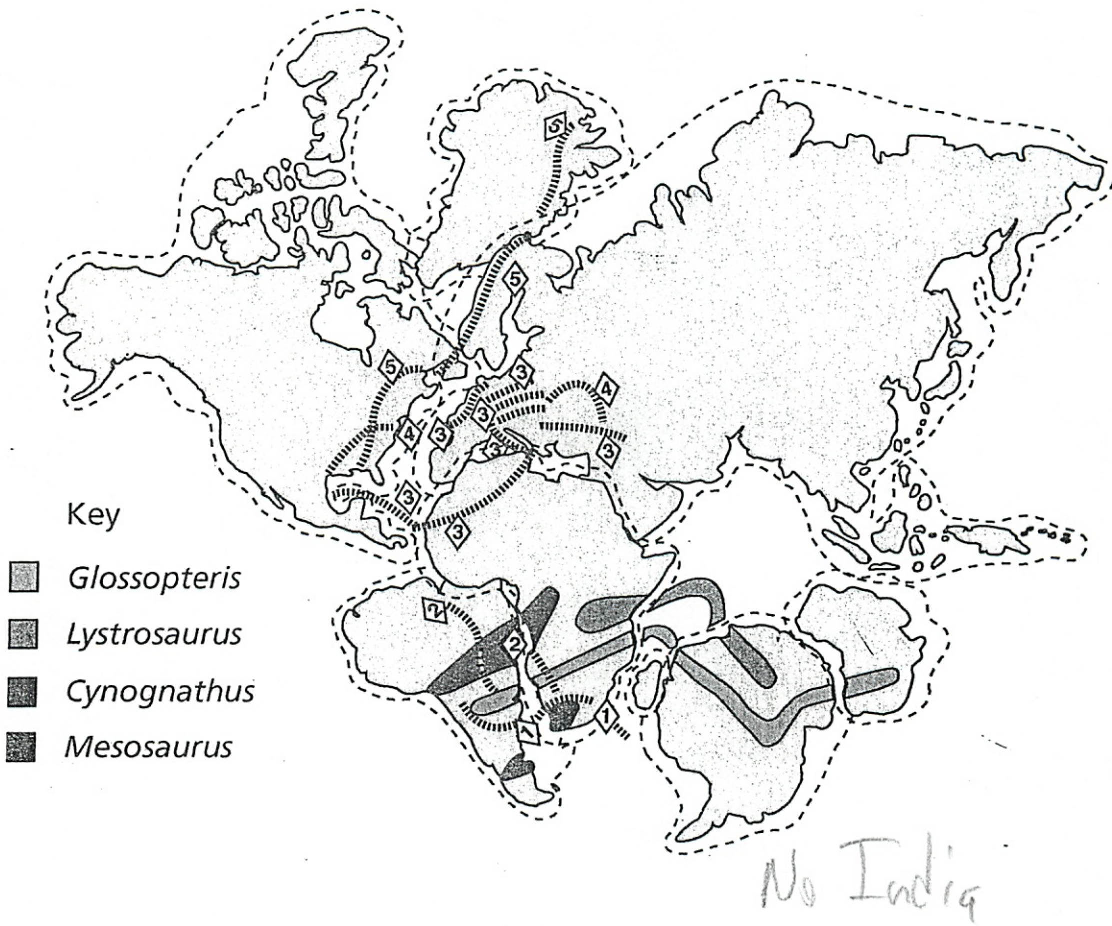
[illegible]

12/16

PD3

63

Most Excepted Map

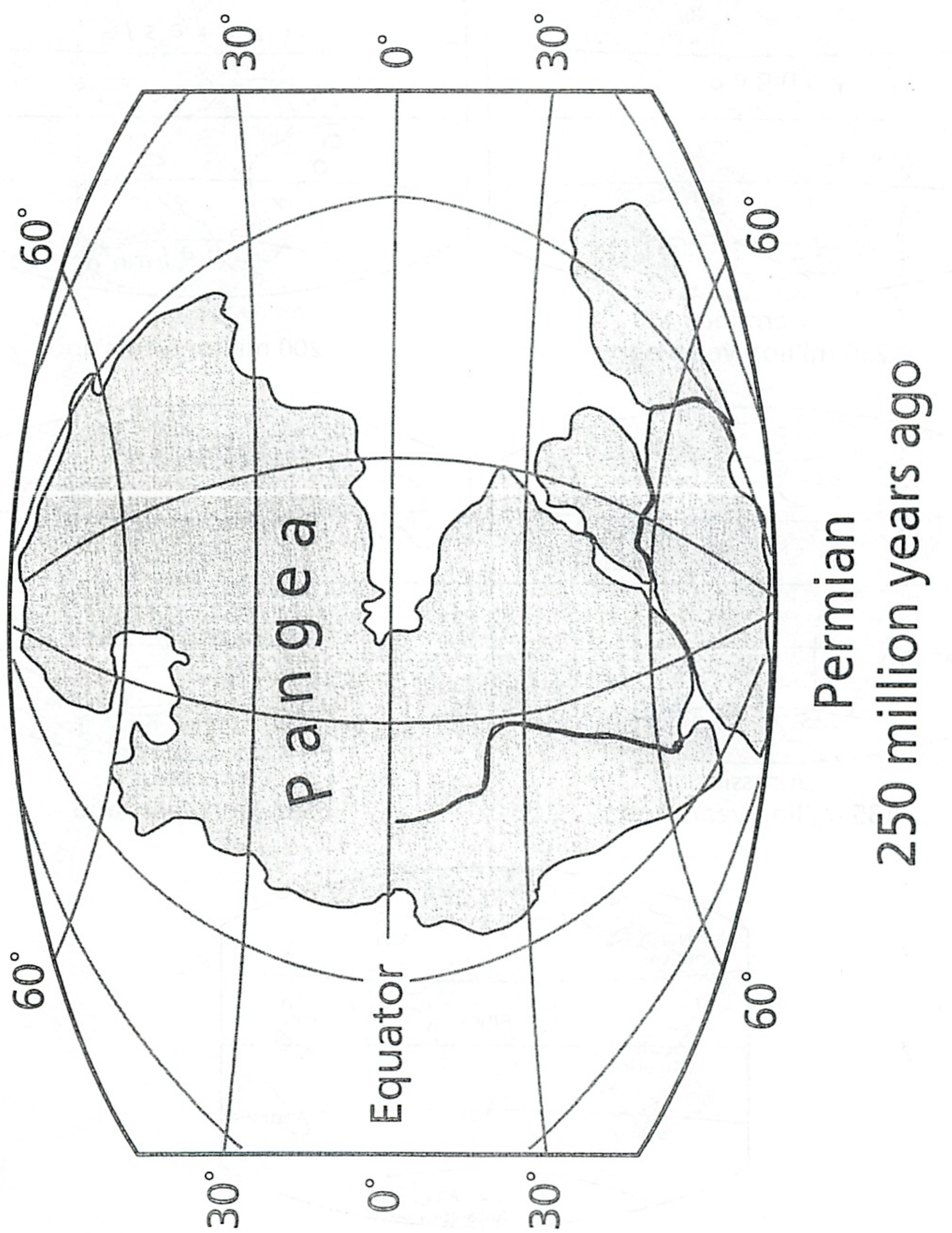


About the Illustration

This is a generalized map of what Pangea probably looked like. There are a number of versions of Pangea reconstruction in the geoscience literature, but they differ only in minor details. There is general agreement that Pangea looked about like this when it was fully assembled. Students may wonder why their reconstructions of past continents look so different from this one. The primary reason for the difference is that students used the current appearance of continents to construct their maps (which include portions of continents that did not exist 250 million years ago), whereas this diagram would have been constructed only upon the basis of rocks at least 250 million years old.

Blackline Master *Our Dynamic Planet* 6.5

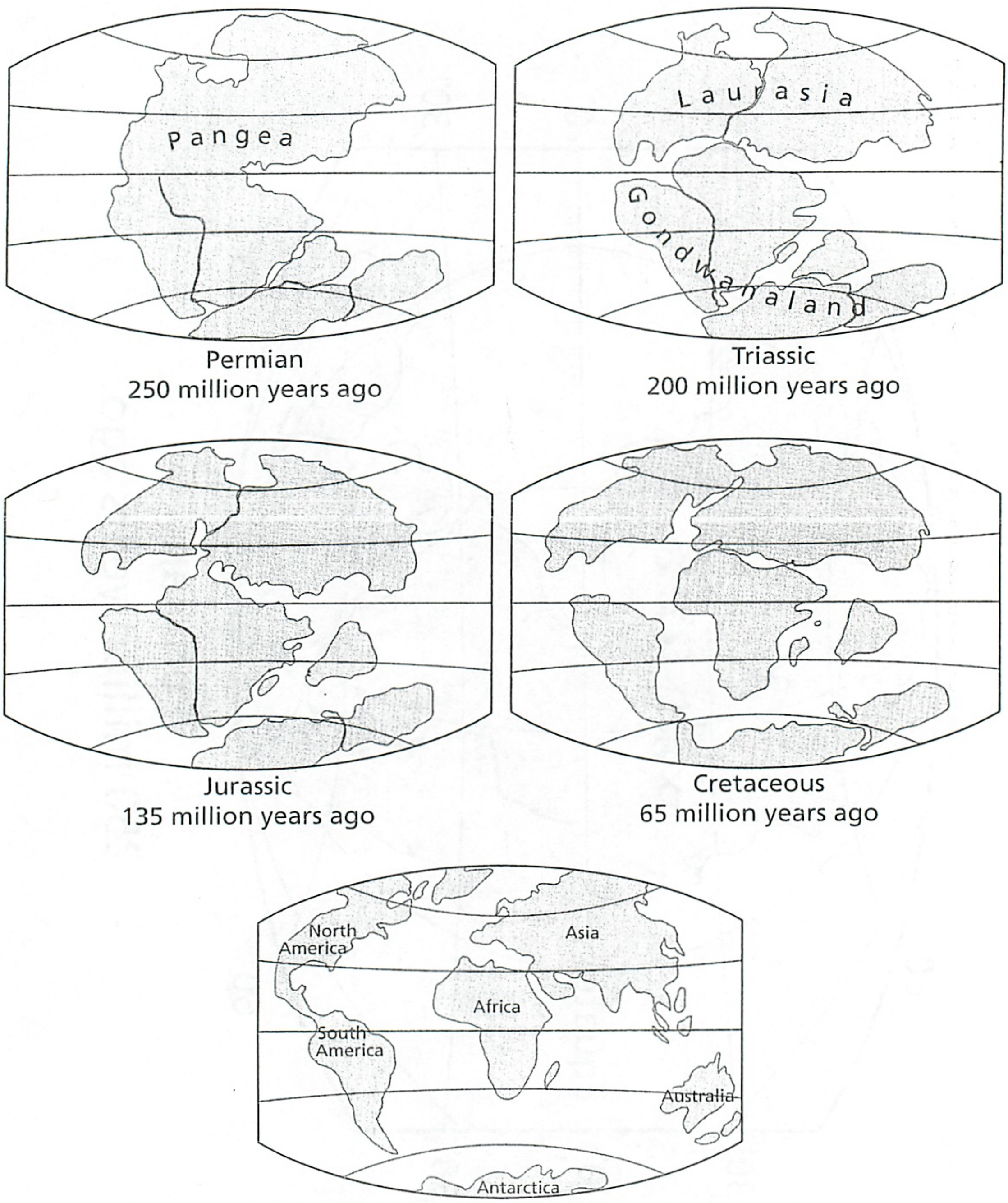
Pangea



Use with *Our Dynamic Planet* Investigation 6: Earth's Moving Continents

Blackline Master *Our Dynamic Planet* 6.6

Breakup of Pangea



Permian
250 million years ago

Triassic
200 million years ago

Jurassic
135 million years ago

Cretaceous
65 million years ago

Present Day

Use with *Our Dynamic Planet* Investigation 6: Earth's Moving Continents

Digging Deeper

Michael Plasmeier Invest 6 12/8

67

1. In own words - Describe Contental Drift

Contental Dirft is when the contents move over the mandle away from where they were previously.

2. What was Pangea?

Pangea was a super content formed by lots of contents coliding with each other. It occured abot 250 million years ago

3. How are sutre zones formed?

The zones are formed by content content colision 250 million years ago in the forming of Pangea.

4. Why is the Pacfic Ocean Shirnking?

The Pacfic Ocean is being consumed by the contents moving twords Hawii. The Atlantic Ocean is getting bigger.

Review + Reflect
Invest 6

Michael Plasmeier 12/10

2. What evidence shows evidence of a supercontent.

All the evidence we talked about. The fit, the mountains, the fossils half a world away, and the glacier shelf.

3. Explain Theory of Contental Drift

I already answered that; They think that the contents moves on ~~top~~ of the mantle and were once one big contenent.

Grade 8 Science

Ms. D'Andrea

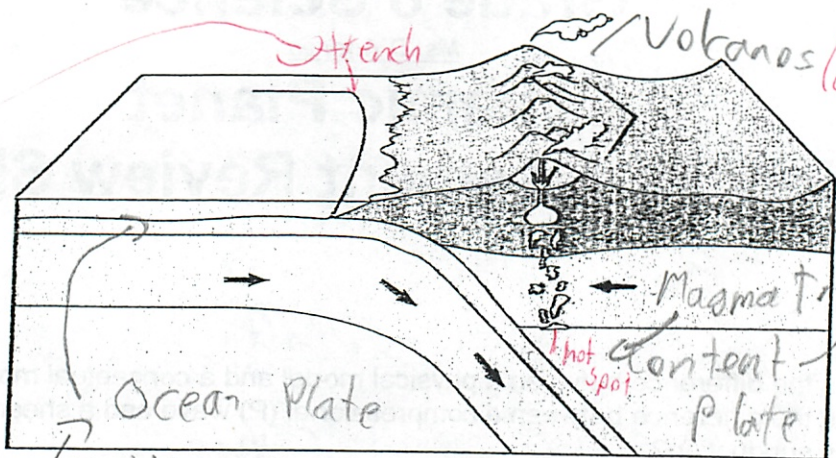
Dynamic Planet
Final Assessment Review Sheet

1. What is the difference between a physical model and a conceptual model?
2. What is the difference between a compressional (P) wave and a shear (S) wave?
3. What is subduction?
4. What is meant by refraction?
5. How does the oceanic crust differ from the continental crust?
6. What do the Earth's crust and mantle have in common?
7. How would you describe the Earth's outer core?
8. What process in the mantle plays an important role in moving Earth's lithospheric plates?
9. What happens at a divergent plate boundary?
10. What happens at a transform plate boundary?
11. What is the difference between an earthquake's epicenter and its focus?
12. How does a tsunami form?
13. What name did Alfred Wegener give to his theory of horizontal movement of the Earth's crust?
14. What name did Alfred Wegener give to his proposed single supercontinent?
15. Which kinds of evidence did Wegener give to support his theory?
16. Why did most scientists of the 1920s reject Wegener's theory?
17. What is the San Andreas Fault in southern California, an example of?
18. New lithosphere is created at what type of plate boundary?
19. What is magma?
20. How would you best describe the movement of Earth's lithospheric plates in terms of speed?
21. Where do most earthquakes occur?

p.37

Label the following diagram and explain why many earthquakes and volcanoes occur at the boundary depicted here.

*Study



This is a subducton zone. ~~The magma is trapped~~ Oceanic plate gets subducted and boms volcoo how il is forced up. Plate melts & causes hot spot. Earthquakes occre because the plates subduding cause volitity in the earth. preasure builds up.

Grade 8 Science

Ms. D'Andrea

Dynamic Planet

Final Assessment Review Sheet – Key

1. A physical model is a structure a scientist builds to represent something else and a conceptual model is a scientist constructs in his or her mind.
2. A compressional wave or P wave is the fastest kind of seismic wave, while a shear wave or S wave is a seismic wave that cannot travel through liquids.
3. Subduction is a process that consumes ocean crust where two plates meet.
4. Refraction is the bending of a wave due to changes in its velocity.
5. Oceanic crust is thinner than continental crust.
6. The Earth's crust and mantle represent layers of the earth, however, they differ in chemical composition, thickness, and density and are separated by the Moho discontinuity.
7. The Earth's core is made of high-temperature liquid iron.
8. Mantle convection plays an important role in moving Earth's lithospheric plates.
9. New crust is formed and spreads apart at a divergent plate boundary.
10. One plate slides past another horizontally at a transform plate boundary.
11. The epicenter of an earthquake is the point on the Earth's surface directly about the focus.

12. A tsunami (giant sea wave) may form when an earthquake occurs on the sea floor.

13. Continental drift was the name Alfred Wegener gave to his theory of horizontal movement of the Earth's crust.

14. Wegener called his proposed single supercontinent, Pangea.

15. The geographic fit of the continents was one piece of evidence Wegener used to support his theory of continental drift.

16. Most scientists of the 1920s rejected Wegener's theory of continental drift because they felt that a mechanism for continents to plow through oceanic crust is lacking.

17. The San Andreas Fault in southern California is an example of a boundary between two plates that are sliding past one another.

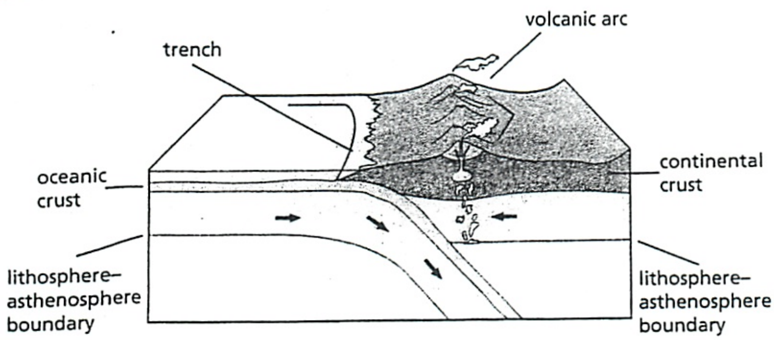
18. New lithosphere is added to plates at a boundary between two plates that are moving apart.

19. Magma is the term used for molten rock within the Earth.

20. The Earth's lithospheric plates move at speeds that average 5 centimeters per year.

21. Most earthquakes occur along plate boundaries.

22. Label the following diagram and explain why many earthquakes and volcanoes occur at the boundary depicted here.



The boundary shown in the diagram is a subduction zone. At this kind of plate boundary, two lithospheric plates move toward one another and an oceanic lithospheric plate is forced below another plate. This oceanic plate is driven down into the mantle is a process called subduction. The interaction of these two plates generates forces that build up the lithosphere. These forces can cause earthquakes, which are the plate's way of relieving the built-up stress. At a certain depth the subducting plate heats up enough to give off water or maybe even melt. This causes volcanoes to occur and explains why volcanoes are common near subduction zones.

12/23

Name Michael Plasmeier Period 3 Date 12/23

Science Video: The Atom

1. All matter is made up of atoms, from the Greek word atomos, meaning, "uncuttable."

2. Atoms are mostly empty space.

3. The middle of the atom is called the nucless. It contains protons, which carry a (+) charge, and netron, which do not carry a charge. They are notual.

4. Buzzing around the atom's nucleus are negatively charged particles called electrons.

5. ele[illegible] is the flow of electrons from one atom to another.

Start of Folder

6. Atoms are so small, you could put one million of them on pin head.

7. Atoms are the basic [illegible]rks of all matter.

8. Atoms combine to make ~~matter~~ or molcues.

9. H_2O is the chemical formula for water, and is two parts hydrogen and one part oxygen.

10. It's the number of protons in the nucleus of an atom that distinguishes one atom from another.

11. Elements are grouped into perials on a table called perodic table of Elements.

12. Each element has a one or two letter ~~abberaation~~ symbol.

13. Each element has an atomic number equal to the number of protons in its nucleus.

14. By smashing atoms we can learn ~~how atoms are constructed~~ what's inside.

15. Inside protons and neutrons are even smaller particles called Quirks ~~Quirks~~.

16. Everything in the universe is either energy or matter.

17. Heat, light, and sound are examples of different forms of energy.

18. The element carbon is found in every living thing - it's the key to life. The branch of science devoted to the study of this element is called ~~carbon~~ organic chemistry.

12/23

Name Michael Plasmeier Period 3 Date 12/23

Science Video: The Atom

C 1. All matter is made up of atoms, from the Greek word atomos, meaning, "uncuttable."

C 2. Atoms are mostly empty space.

C 3. The middle of the atom is called the nucless. It contains protons, which carry a (+) charge, and netron, which do not carry a charge. They are notual.

C 4. Buzzing around the atom's nucleus are negatively charged particles called electrons.

X 5. electicity is the flow of electrons from one atom to another.

C 6. Atoms are so small, you could put one million of them on pin head.

C 7. Atoms are the basic building blocks of all matter.

C 8. Atoms combine to make ~~matter~~ or molcues.

C 9. H_2O is the chemical formula for water, and is two parts hydrogen and one part oxgen.

10. It's the number of ___protons___ in the nucleus of an atom that distinguishes one atom from another.

11. Elements are grouped into ___perials___ on a table called ___peraidic table of Elements___.

12. Each element has a one or two letter ___~~abberaations~~___. symbol

13. Each element has an atomic number equal to the number of ___protons___ in its nucleus.

14. By smashing atoms we can learn ___~~how atoms are constructed~~___. what's inside

15. Inside protons and neutrons are even smaller particles called ___[illegible]___.

16. Everything in the universe is either ___energy___ or matter.

17. Heat, light, and sound are examples of different forms of ___energy___.

18. The element ___carbon___ is found in every living thing – it's the key to life. The branch of science devoted to the study of this element is called ___~~carbon~~ organic___ chemistry.

Name ____________ Date ________ Class ________

EXPLORATION 1

Chapter 5
Exploration Worksheet

Making the Case, page 88

Your goal	to prepare a case for or against the particle theory of matter	Safety Alert!

You Will Need

- red food coloring
- an eyedropper
- a stirring rod
- a 100 mL beaker
- 500 mL of sand
- water
- 500 mL of dried peas or beans
- 40 mL of rubbing alcohol
- 4 large containers
- 25 mL of salt
- 2 graduated cylinders
- a funnel
- a stopwatch or clock

Part 1: A Thought Experiment

What to Do

Read the observation and inferences about liquid and frozen water. Then answer the questions that follow.

Molcues come togther
Ice contracts + becomes less dence

Observation

In the freezer, ice cubes become smaller over time.

Questions

- Where does the ice go?

~~The molocues shrink together~~

- How does it disappear?

~~" "~~

- Can ice be prevented from disappearing?

~~keep at just freezing~~ high presure

Inference and Possible Explanation

- Perhaps ice (water) is made up of particles.
- Maybe some of these particles escaped from the solid state to form a gas, which floated away.

evaporating

Follow-Up

1. Name another substance that changes directly from a solid into a gas.

? sublimation (process)
moth balls
dry ice

Chapter 5

Name ____________________ Date __________ Class __________

2. Could a gas change directly into a solid? If so, think of some examples.

Yes, can't think, so maybe it doesn't
iodine
water → frost (below frozen)

3. Do these observations and explanations support the idea that water is made up of particles? Why or why not?

No, I don't think so. However water is unique in this way. It is also however made of particles
particles can separate and spred out to sublime

Part 2: Seeing Red

What is the largest amount of water in which you could dissolve a drop of red food coloring and still detect its color? Here is a way to find out.

What to Do

diluting

1. Thoroughly dissolve a drop of food coloring in 50 mL of water.
2. Now divide this solution into two equal parts.
3. Wash 25 mL down the sink, and add 25 mL of water to what remains.
4. Once again the total volume of the solution is 50 mL. Is the solution still colored red?

   Yes

pink, v light

5. The concentration of the food coloring has been diluted to one-half of the original amount. Repeat the dilution process once more. Can you still see the red coloring in the water?

   Yes

Very light

6. Your beaker now contains one-quarter of the original drop of food coloring. Repeat the procedure—keeping accurate records below—until you no longer see the red color.

   4th time can't see it
   1/16th

Very hard to do it right

Name ______________________ Date __________ Class __________

Questions

Before going on to Part 3, discuss the following questions with a partner and write your conclusions in the space provided:

1. Is the color spread evenly throughout the solution, or are bits of food coloring clumped together?

   Spred up evenly, but concitated twords top

2. Do you think there may be some food coloring left in the solution at the end, even though you cannot see any? How much of the food coloring do you have in the beaker of water at the end of the experiment? How do you know?

   Yes, not much, bet we can't see it's very small partides

3. If matter is made up of particles, what can you infer about the size of the food-coloring particles?

   They are very spred out

4. Does the experiment support the particle theory of matter? Why or why not?

   Yes, the particles are very spreal out, but still there. They are mixed into the rest

Name ______________________ Date ____________ Class ____________

Part 3: Pour Judgment

Dried peas

Water

Sand

Illustration also on page 89 of your textbook

What to Do

1. Fill three large containers with the substances listed below. Do not mix the substances.
   - dried peas or beans
   - sand
   - water
2. Now pour each substance into an empty container.
3. Did either of the first two substances resemble water in the way they poured?

Sand did kind of resemple
Peas didn't really resemble, but
if we would observe from far away
they all would look the same

4. What might you infer about matter from this experiment?

They might all be made of partices
water: looks like really small particle
sand: medium sized looks like it
pears: resembles large sized partices

Part 4: When 1 + 1 ≠ 2

What to Do

Carry out the following three activities. After making careful observations, use them to develop inferences about the unseen structure of matter.

> To read volume, locate the curve at the top of the liquid. Read at eye level the lowest point of the curve.

1. Pour 50 mL of sand into a 100 mL graduated cylinder. Then pour 50 mL of water into another 100 mL graduated cylinder. Carefully pour the water into the sand. Record the volume of the mixture. Suggest an explanation for why the combined volume is not 100 mL.

62 mL The water particles fills in
the empty spaces between the sand
particles

2. Put 25 mL of salt into a graduated cylinder. Add enough water to bring the combined volume of salt and water to 100 mL. Without spilling the contents, gently shake the cylinder for a minute or two. Record the volume after shaking. How do you explain the final volume of salt and water?

95 ml The salt "disloved" into the water. The particles spred out throught the water.

3. Pour 50 mL of water into a graduated cylinder. Then pour 40 mL of alcohol into a second cylinder. Pour the alcohol into the water and stir. Is the volume of the two combined liquids 90 mL? Explain.

88 ML · 90 Same · Because the particles didn't mix · was supose to be less

Sci Plus Blue

Drawing Conclusions

Do your observations support the idea that matter consists of particles? Why or why not? Summarize your case for or against a particle theory of matter.

Yes says in the book. Also we found out in Part 4 that water fills around sand particls, even though the things are made of indiviual partices some particles are very bonded togther. The larger particl in Part C did flow like water if viewed from far away. Part B showed the food coloring partices desolve evenly to be poured away. Part A shows how the molcues bond closer together.

See part a answer

Sublimation → solid to gas

Name Michael Plasmeier Period 2 Date 1/18

Physical Properties of Matter

1. Write a description of the physical properties of one household object. You may be asked to read your description aloud, while class members try to identify the object.

solid
all different colors
part not really flexable - opaque
other very flexable - translucent

Answer: book

alwas 1 propert that is different

2. Describe one way for each of the following objects to undergo **a physical change**:

a. a pencil - burn it — can't be sharpen it; crush it
b. an aluminum can - melt it — freeze it
c. a sugar cube - dislove — heat it
d. firewood - burn it
e. a paper clip - disolve it — ~~sharpen it~~
f. water - ~~mix it~~ freeze it
g. a cloud - mix it ? condence it — ~~bend it~~
h. hair - burn it

3. **Density** — $D = \frac{m}{V}$ - mass / volum

You can rearrange the equation for density to find **mass and volume**, as shown below:

$m = DV$ $\qquad$ $V = \frac{m}{D}$

a. Find the density of a substance with a mass of 5 kg and a volume of $43m^3$.

$m = 5(43m^3) = 215 kg/m^3$ — math because 2 differen units

already had mass

$\frac{5 kg}{43 m^3} = 0.116 kg/m^3$

allmeasures.com/Formulae
(25 °F)

m L
[illegible] [illegible] is

b. Suppose you have a lead ball with a mass of 454 g. What is its volume?

0.000040035 m^3

Density: 11340 kg/m^3

Chart: 40 cm^3

c. What is the mass of 15mL sample of mercury?

0.0020355 kg

Density = 13570 kg/m^3

203.25 g

should tell us Density — over there

She did.

d. A block of pine wood has a mass of 120 g and a volume of 300 cm^3. What is the density of the wood? Would this block of pine float in a pool of water? Explain.

120 / 300 = .4 Yes it would flote. it is less dence then water

About: 590 kg/m^3 actual

e. A sample of metal has a mass of 4, 059 g and a volume of 453 cm^3. What metal is this?

8.96 g/cm^3 density

Copper

Actual: 8920 kg/m^3

4. List five (5) physical properties of water.

liquid — Color less — all 3 states

transparent

able to dislove (universal solvent)

netrual pH

Conduct heat very good

Boiling point = 100°C

liquid at room temp

take shapes of container

Pounded into sheets

in wire

5. How could you determine the **relative densities** of liquids?

by taking the mass and volume (estimate)

If you have 3 different substances you could mix them and let them shift out. Like oil and vinigar

6. How could you determine that a coin is not pure silver?

Find the true density of the coin and compear it to the density of silver

(10.5 g/cm³)

Densities of Common Substances*

Substance	Density (g/cm³)	Substance	Density (g/cm³)
Helium (gas)	0.0001663	Copper (solid)	8.96
Oxygen (gas)	0.001331	Silver (solid)	10.50
Water (liquid)	1.00	Lead (solid)	11.35
Iron pyrite (solid)	5.02	Mercury (liquid)	13.55
Zinc (solid)	7.13	Gold (solid)	19.32

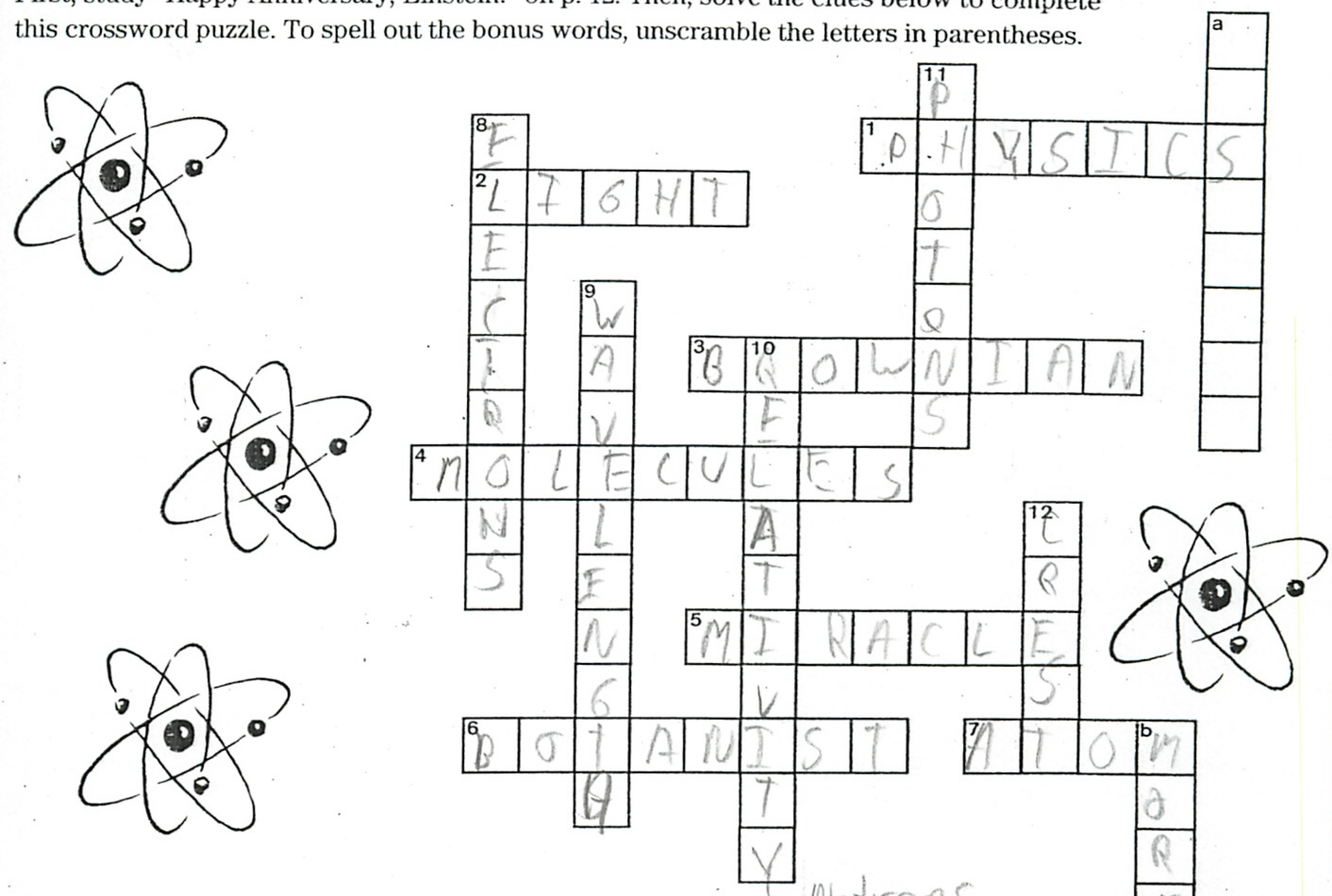
* at 20°C and normal atmospheric pressure

There it is

Name: Michael Plasmeier

EUREKA, EINSTEIN!

First, study "Happy Anniversary, Einstein!" on p. 12. Then, solve the clues below to complete this crossword puzzle. To spell out the bonus words, unscramble the letters in parentheses.



ACROSS

1. Albert Einstein's area of science expertise: _ _ _ _ _(_)_
2. The speed of _ _ _ _ _ is about 300,000 kilometers (186,000 miles) per second.
3. The random, jerky movement of tiny particles suspended inside a water droplet is called _(_)_ _ _ _ _ _ motion.
4. (_)_ _ _ _ _ _ _ _ are particles of two or more atoms joined together.
5. Because of Einstein's multiple discoveries in 1905, the year has been dubbed the _ _ _ _ _ _(_) year.
6. A plant scientist is called a _ _ _(_)_ _ _ _.
7. An _ _(_)_ is the smallest unit of an element.

DOWN

8. _ _ _ _(_)_ _ _(_) are negatively charged particles.
9. _ _ _(_)_ _ _ _ _ _ describes the number of waves passing per second.
10. The formula $E=mc^2$ is part of Einstein's Special Theory of _(_)_ _ _ _ _ _ _ _.
11. Light is made up of individual particles of energy called _(_)_ _ _ _.
12. The _(_)_ _ _ is the highest point on a wave.

BONUS: Einstein quotes

a. "If we knew what it was we were doing, it would not be called _ _ _ _ _ _ _ _, would it?"

b. "Imagination is _ _ _ _ important than knowledge."

ANSWERS ON TE 8

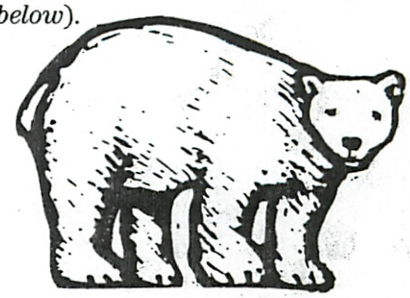
Name: ______________________________

ARCTIC EXPEDITION

In "Treacherous Travels" (p. 18), you learned about the Arctic environment. Now, you wonder: What kind of wildlife calls this cold and icy place home? To find out, you take off on an Arctic adventure. Head "Up North" (*see box, below*) and dig for the information to fill in your "Travel Journal" (*below*).

UP NORTH

www.thearctic.is/index.html
www.mnh.si.edu/arctic/html/wildlife.html



TRAVEL JOURNAL

1. You arrive in the Arctic. Unfamiliar with your new surroundings, you seek out some people for survival advice. You travel to the **homeland** of the __Komi__ people. This **native group** from western Siberia in northern Russia lives along the River Ob. You make friends with them by helping them catch some __fish__—their primary source of food and money.

2. Your new friends warn you to keep your eyes open: You must watch out for __polar__ __bears__. This huge sea mammal's fur appears white—making it hard to spot against the ice and snow. It is a very strong and dangerous animal and it may attack you. Also, pay attention to the __Arctic__ __Fox__. In the wintertime, this sneaky mammal survives by following other predators and eating their leftovers. Be careful not to leave scraps of food around your camp, or you may have some hungry visitors looking for their next meal.

3. The Arctic has more wildlife than you expected. You're surprised to catch a glimpse of a __Bald__ __Eagle__, the national bird of the United States; you've never even seen one back home! You read in your guidebook and learn that these birds used to be seen throughout the U.S. and Canada. They are now mostly seen in isolated regions like the Arctic because __people__ have disturbed much of their __habit__ and __natural__ areas. Be sure to have your camera ready: These majestic creatures catch fish with their __beaks__ while flying close to the surface of waters. Your friends will want to see a photo of that!

4. As you trek across the frozen Arctic Ocean, you look down and spy a "white whale," more commonly known as the __Belugo__ __Whale__. These animals are very social. It's believed that they can __talk__ their __Sounds__. That helps them communicate with each other. These creatures make a lot of sounds. They are so "talkative" that they have been nicknamed __Sea__ __Canaries__. Sound is important to the survival of these animals: They use __ecolocation__, a process that uses sound to find the distance of prey.

5. No visit to the Arctic is complete without seeing reindeers. You meet a scientist, who tells you about the two ways that reindeer hair helps the animal brave the cold environment. Write down the two ways before you forget.

__isulation__
__trade__
____

6. At the end of your journey, you sit down to warm up with a cup of hot cocoa. You decide to write a letter to your friends back home. Use a separate sheet of paper to write this letter. Be sure to include the following:

- A description of an Arctic bird and a mammal you found interesting. For example: What do they eat, where do they live, etc.?
- Draw a picture of each of the two animals.

ANSWERS ON TE 8

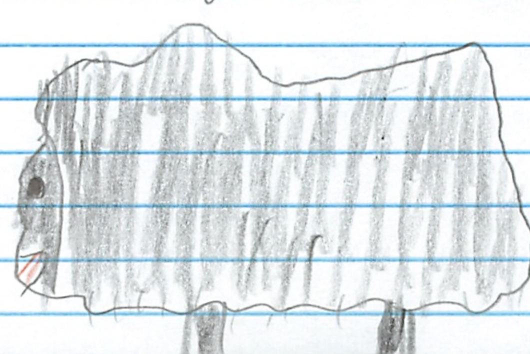
Arctic Letter

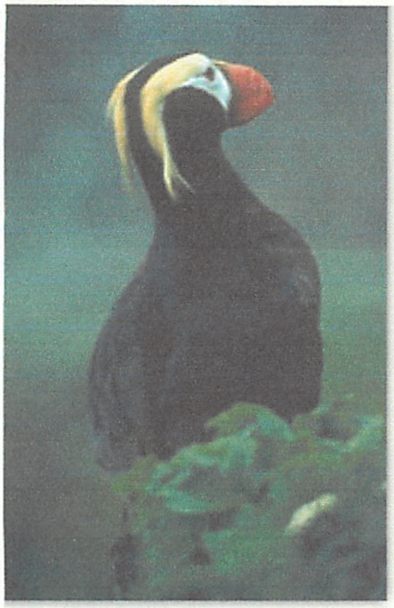
Michael Plasmeier 1/25

Dear Nice and warm,

I am sitting here living cold in the Artice. Outside my window a Puffin just flew by. A tuffed Puffin dive only up here in the North Paific. Their colored hair on the top of their head lets you tell them apart from other birds. They are about the same size as a pigon but are twice as hevey. They dig holes in the ground to nest. They can also carry 12 fish in their beaks back to their young.

Wait, now a Must Ox is walking around. It looks like a bison, however it is covered in shaggy fir. The wool is in big demand to make clothes unfortunetly. They only eat plants, but if a wolf comes the gather in a circle around their young. They then flip the wolf into the air and then they stomp on it. Thats all for now. I include some pictures and info about the animals





Tufted Puffin
Photo © Eric P. Hoberg

Tufted Puffin

Fratercula cirrhata.

Tufted Puffins breed only on islands and rocky cliffs in the arctic waters of the North Pacific, which includes the Arctic, Bering, and Okhotsk seas. They are most commonly seen flying near land, coming or leaving the breeding colonies to feed their young. Tufted Puffins are the size of pigeons, but weigh nearly twice as much (1 kg, 2 lbs)! In flight they look like flying cigars, moving very quickly close to water. They feed by diving, then flying under water with their wings in pursuit of small minnow-like fish. Puffins hold the fish in their bills until they return to the nest to feed the puffin chicks. Sometimes a parent puffin will carry a dozen fish carefully arranged head-to-tail in their bills! How do they do that? No one knows, because no one has watched puffins long enough under water.

Puffins breed in holes they dig into the ground and build their nests. Puffin chicks will come out only when they are ready to fly; before then they will never see the light or go outside. Puffins breed in colonies, some with only a few nests and some very large. The largest colony is found on Talan Island in the Okhotsk Sea and has more than one million nests!

Muskox
Photo © Eric P. Hoberg

Muskox
Photo © Eric P. Hoberg

Muskox

Ovibos moschatus

Muskox are large animals that look a lot like bison, but have wool like sheep. Their long brown wool hangs almost to their feet! If you visit Alaska you will find woven musk ox wool scarves at many tourist shops. Most of the arctic tundra was host to the musk ox long ago. Neolithic hunters hunted them almost to extinction. Today they can be found in northern Canada roaming wild, and on farms in Unalakleet, Alaska where they are raised for wool.

Muskox roam wild in herds of 10-20 individuals. When they are threatened by a wolf their main predator (other than man) they will form a circle around their young to protect them. Muskox have been known to scoop up wolves with their horns, hurl them into the air and then stomp them under hoof. Although this may seem violent, muskox are mainly peaceful animals who eat only plants. Their name comes from the musky smell of their urine which is especially strong in mating season. Muskox usually bear one calf every two years.

The Properties of Water

1

Guide for Reading

- How does the chemical structure of water molecules cause them to stick together?
- How does water dissolve other polar substances?
- What are the three states in which water exists on Earth?

A water molecule is made up of two hydrogen atoms bonded to an oxygen atom. Each end of a water molecule has a slight electric charge. A molecule that has electrically charged areas is called a **polar molecule. The positive hydrogen ends of one water molecule attract the negative oxygen ends of nearby water molecules. As a result, the water molecules tend to stick together.**

Many of water's unusual properties occur because of the attraction among its polar molecules. **Surface tension** is the tightness across the surface of water that is caused by polar molecules pulling on each other. **Capillary action** is the combined force of attraction among water molecules and with the molecules of surrounding materials.

A **solution** is a mixture that forms when one substance dissolves another. The substance that does the dissolving is called the **solvent. One reason that water is able to dissolve many substances is that it is polar. The charged ends of the water molecule attract the molecules of other polar substances.**

Water exists in three **states,** or forms: solid, liquid, and gas. **Ice is a solid, water is a liquid, and water vapor is a gas.** Change of state is related to temperature, which is a measurement of the average speed of molecules. When the temperature reaches 0°C, the solid ice melts and becomes liquid water. At 100°C, liquid water boils and the molecules have enough energy to escape the liquid and become water vapor. Liquid water also becomes a gas through **evaporation,** which is the process by which molecules at the surface of a liquid absorb enough energy to change to the gaseous state.

The process by which a gas changes to a liquid is called **condensation.** As the temperature of the gas cools down to 100°C, the molecules slow down and begin to change back to the liquid state. When water cools below 4°C, the molecules line up in a crystal structure. Water molecules take up more space in this crystal structure than as a liquid. This means that ice is less dense than liquid water, and thus floats on liquid water.

Specific heat is the amount of heat needed to increase the temperature of a certain amount of a substance. Compared to other substances, water requires a lot of heat to increase its temperature.

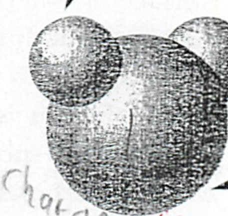
It can absorb (loose) lots of energy before the temp can start moving

The Properties of Water

◆ Understanding Main Ideas

Label the parts of this water molecule by writing the name of the element and the electrical charge in items 1 through 3.

Answer the following questions on a separate sheet of paper.



1. Element Hydrogen
   Charge +
2. Element Hydrogen
   Charge +
3. Element Oxygen
   Charge −

4. Why is water considered a polar substance? It's element carry a charge some areas - opposite charges
5. What property of water allows fish in a lake to survive winter's freezing temperatures? Only the top layer that is exposed to cold oxygen ~~changes~~
6. What happens to the molecules of water vapor when the temperature of the gas cools to 100°C? they slow down + condense to liquid
7. Why is water often called the "universal solvent"? its polarity attracts other substances and it can dissolve in more substances than everything else

◆ Building Vocabulary

Match each term with its definition by writing the letter of the correct definition in the right column on the line beside the term in the left column.

e	8. capillary action	a. a mixture that forms when one substance dissolves another
f	9. condensation	b. form of a substance, including solid, liquid, or gas
d	10. evaporation	c. the tightness across the surface of water caused by the polar molecules pulling on each other
h	11. specific heat	d. the process by which molecules at the surface of a liquid absorb enough energy to change to the gaseous state
a	12. solution	e. the combined force of attraction among water molecules and with the molecules of surrounding materials
g	13. solvent	f. the process by which a gas changes to a liquid
b	14. state	g. a substance that dissolves another substance
c	15. surface tension	h. the amount of heat needed to increase the temperature of a certain amount of a substance by 1°C

Ethyl alcohol

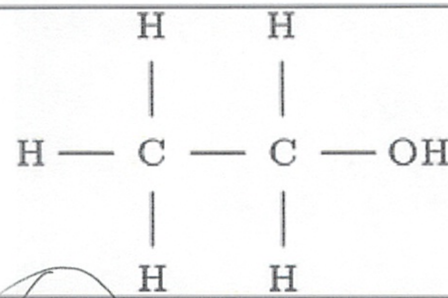
From Wikipedia, the free encyclopedia.
(Redirected from Ethanol)

Ethyl alcohol, also known as **ethanol** or **grain alcohol**, is a flammable, colorless chemical compound, one of the alcohols that is most often found in alcoholic beverages. In common parlance, it is often referred to simply as *alcohol*. Its chemical formula is C_2H_5OH.

This article is mostly about ethanol as a chemical compound. For beverages containing ethanol, see *alcoholic beverages*. For the use of ethanol as a fuel, see *alcohol fuel*.

Contents

Properties

General	
Name	Ethanol
	
Chemical formula	C_2H_5OH
Molecular weight	46.069 amu
CAS number	64-17-5
UN number	1170
Phase behavior	
Melting point	158.8 K (-114.3°C, -173.83°F)
Boiling point	351.5 K (78.4°C, 173.03°F)
Triple point	159 K (-114°C, -173.47°F)
Critical point	514 K (241°C, 465.53°F) 63 bar
$\Delta_{fus}H$	4.9 kJ/mol
$\Delta_{fus}S$	31 J/mol·K
$\Delta_{vap}H$	38.56 kJ/mol
Solubility	Soluble in water
Acid-base properties	
pKa	15.9
pH	7.0 (Neutral)
Liquid properties	
$\Delta_f H^0_{liquid}$	-277.38 kJ/mol
S^0_{liquid}	159.9 J/mol·K
C_p	112.4 J/mol·K
Density	789 gram/l
Gas properties	

History

Ethanol has been known to humans since prehistory as the active ingredient of alcoholic beverages. Its isolation as a relatively pure compound was probably achieved first by Islamic alchemists who developed the art of distillation, such as Geber (721-815) and Al-Razi (864-930).

Production

flamable ethanol in a secure bottle

Ethanol for use in alcoholic beverages is produced by fermentation: it is a product of sugarmetabolism in certain species of yeast in the absence of oxygen. The process of culturing yeast under conditions to produce alcohol is referred to as brewing. Yeasts can grow in the presence of up to only about 14% alcohol, but the concentration of alcohol in the final product can be increased by distillation.

For a mixture of ethanol and water, there is a maximum boiling azeotrope at 95% and 5% water. For this reason, fractional distillation of ethanol-water mixtures (of less than 95% ethanol) cannot yield ethanol purer than 95%. Therefore, 95% ethanol in water is a fairly common solvent.

To produce absolute ethanol, a small amount of benzene is added, and the mixture is again fractionally distilled. Benzene forms a trinary azeotrope with water and ethanol to remove the last of the water, and a binary azeotrope with ethanol removes most of the benzene. The resulting ethanol is water free, for processes that require it. However, several ppm of benzene remains, so consumption by humans leads to distinctive liver damage.

Ethanol is also used as a fuel and in a wide variety of industrial processes. Ethanol for industrial use is often made from petroleum feedstocks, typically by the catalytic hydration of ethylene (Sulphuric acid being the usual catalyst); this is cheaper than the production by fermentation.

Ethanol for industrial use is normally made unfit for human consumption ("denatured") by the inclusion of small amounts of substances that are either toxic (such as methanol) or unpleasant (such as denatonium benzoate), thus avoiding the applicable taxes or inventory controls. Denatured ethanol has the UN number UN 1987 and toxic denatured ethanol has UN 1986.

ΔH_f^0 gas	-235.3 kJ/mol
S^0 gas	? J/mol·K
C_p	65.21 J/mol·K
Safety	
Acute effects	Nausea, vomiting, CNS depression. Respiratory failure in severe cases.
Chronic effects	Dependency. Liver cirrhosis.
Flash point	17°C (62.6°F)
Autoignition temperature	425°C (797°F)
Explosive limits	3.5-15%
More information	
Properties	NIST WebBook (*http://webbook.nist.gov/cgi/cbook.cgi?ID=C64175&Units=SI*)
MSDS	Hazardous Chemical Database (*http://ull.chemistry.uakron.edu/erd/chemicals1/7/6464.html*)

Unless otherwise stated, all data was produced under conditions of standard temperature and pressure.

Disclaimer and references

Use

Ethanol is used in antifreeze products for its low melting point.

It is easily soluble in water and is itself a good solvent, used in perfumes, paints and tinctures. Alcoholic drinks have a large variety of tastes because various flavor compounds are dissolved during brewing.

A solution of 70-85% of ethanol is commonly used as a disinfectant. It kills organisms by denaturing their proteins and dissolving their lipids and is effective against most bacteria and fungi, and many viruses, but is ineffective against bacterial spores. Because of this disinfectant property, alcoholic beverages can be stored for a long time.

See also

- alcohol fuel
- alcoholic beverages
- biodiesel
- denatured alcohol
- methanol
- propyl alcohol

External links

- Alcohol in Arabic sources (*http://www.gabarin.com/ayh/alcohol.htm*) (Geber but no mention of Al-Razi).

Retrieved from "http://en.wikipedia.org/wiki/Ethyl_alcohol"

Categories: Over-the-counter substances | Psychoactive drugs | Teratogens

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- This page was last modified 04:06, 25 Jan 2005.
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Chemical of the Week

ETHANOL

Ethanol (ethyl alcohol, grain alcohol) is a clear, colorless liquid with a characteristic, agreeable odor. In dilute aqueous solution, it has a somewhat sweet flavor, but in more concentrated solutions it has a burning taste. Ethanol, CH3CH2OH, is an alcohol, a group of chemical compounds whose molecules contain a hydroxyl group, –OH, bonded to a carbon atom. The word alcohol derives from Arabic al-kuhul, which denotes a fine powder of antimony used as an eye makeup. Alcohol originally referred to any fine powder, but medieval alchemists later applied the term to the refined products of distillation, and this led to the current usage.

Ethanol melts at –114.1°C, boils at 78.5°C, and has a density of 0.789 g/mL at 20°C. Its low freezing point has made it useful as the fluid in thermometers for temperatures below –40°C, the freezing point of mercury, and for other low-temperature purposes, such as for antifreeze in automobile radiators.

Ethanol has been made since ancient times by the fermentation of sugars. All beverage ethanol and more than half of industrial ethanol is still made by this process. Simple sugars are the raw material. Zymase, an enzyme from yeast, changes the simple sugars into ethanol and carbon dioxide. The fermentation reaction, represented by the simple equation

$$C_6H_{12}O_6 \longrightarrow 2\ CH_3CH_2OH + 2\ CO_2$$

is actually very complex, and impure cultures of yeast produce varying amounts of other substances, including glycerine and various organic acids. In the production of beverages, such as whiskey and brandy, the impurities supply the flavor. Starches from potatoes, corn, wheat, and other plants can also be used in the production of ethanol by fermentation. However, the starches must first be broken down into simple sugars. An enzyme released by germinating barley, diastase, converts starches into sugars. Thus, the germination of barley, called malting, is the first step in brewing beer from starchy plants, such as corn and wheat.

The ethanol produced by fermentation ranges in concentration from a few percent up to about 14 percent. Above about 14 percent, ethanol destroys the zymase enzyme and fermentation stops. Ethanol is normally concentrated by distillation of aqueous solutions, but the composition of the vapor from aqueous ethanol is 96 percent ethanol and 4 percent water. Therefore, pure ethanol cannot be obtained by distillation. Commercial ethanol contains 95 percent by volume of ethanol and 5 percent of water. Dehydrating agents can be used to remove the remaining water and produce absolute ethanol.

Much ethanol not intended for drinking is now made synthetically, either from acetaldehyde made from acetylene, or from ethylene made from petroleum. Ethanol can be oxidized to form first acetaldehyde and then acetic acid. It can be dehydrated to form ether. Butadiene, used in making synthetic rubber, may be made from ethanol, as can chloroform and many other organic chemicals. Ethanol is used as an automotive fuel by itself and can be mixed with gasoline to form gasohol. Ethanol is miscible (mixable) in all proportions with water and with most organic solvents. It is useful as a solvent for many substances and in making perfumes, paints, lacquer, and explosives. Alcoholic solutions of nonvolatile substances are called tinctures; if the solute is volatile, the solution is called a spirit.

Most industrial ethanol is denatured to prevent its use as a beverage. Denatured ethanol contains small amounts, 1 or 2 percent each, of several different unpleasant or poisonous substances. The removal of all these substances would involve a series of treatments more expensive than the federal excise tax on alcoholic beverages (currently about $20 per gallon). These denaturants render ethanol unfit for some industrial uses. In such industries undenatured ethanol is used under close federal supervision.

When an alcoholic beverage is swallowed, it passes through the stomach into the small intestine where the ethanol is rapidly absorbed and distributed throughout the body. The ethanol enters body tissues in proportion to their water content. Therefore, more ethanol is found in the blood and the brain than in muscle or fat tissue. The ethanol is greatly diluted by body fluids. For example, a 1-ounce shot of 100-proof whiskey, which contains 0.5 fluid ounces of ethanol (about 15 mL), is diluted 5000-fold in a 150-pound human, producing a 0.02% blood alcohol concentration.

Ethanol is toxic, and the body begins to dispose of it immediately upon its consumption. Over 90% of it is processed by the liver. In the liver, the alcohol dehydrogenase enzyme converts ethanol into acetaldehyde, which is itself toxic.

$$CH_3CH_2OH \longrightarrow CH_3{-}\overset{\overset{\displaystyle O}{||}}{C}{-}H \quad + \ 2\ H$$

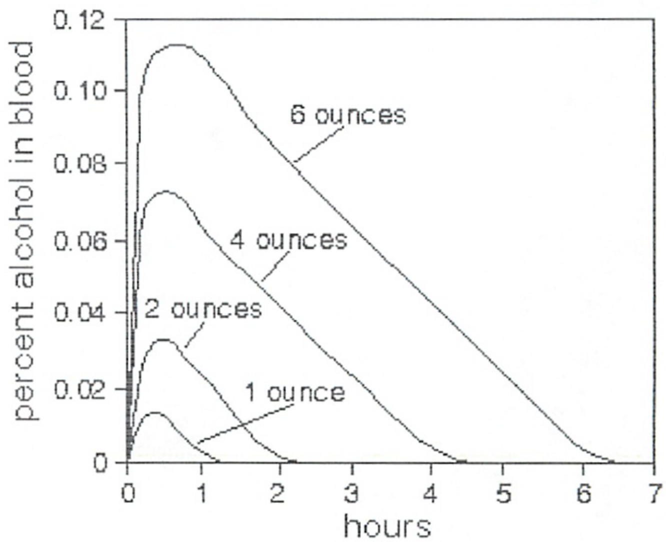
Acetaldehyde is destroyed almost immediately by the aldehyde dehydrogenase enzyme, which converts it to acetate ions.

$$CH_3-\overset{O}{\overset{\|}{C}}-H + H_2O \longrightarrow CH_3-\overset{O}{\overset{\|}{C}}-O^- + 3\ H$$

The hydrogen atoms represented by these equations are not unattached, but are picked up by another biologically important compound, nicotinamide-adenine dinucleotide (NAD), whose function is to carry hydrogen atoms. NAD is involved in both of the above processes, being converted to NADH.

$$NAD + H \longrightarrow NADH$$

NADH must be recycled to NAD for the disposal of ethanol to continue. If the amount of ethanol consumed is not great, the recycling can keep up with the disposal of ethanol. The ethanol disposal rate in a 150-pound human is about 0.5 ounce of ethanol per hour, which corresponds to 12 ounces of beer, 4 ounces of wine, or 1 ounce of hard liquor. The figure shows how the blood alcohol level changes with time for various doses of ethanol.



Ethanol acts as a drug affecting the central nervous system. Its behavioral effects stem from its effects on the brain and not on the muscles or senses themselves. It is a depressant, and depending on dose, can be a mild tranquilizer or a general anesthetic. It suppresses certain brain functions. At very low doses, it can appear to be a stimulant by suppressing certain inhibitory brain functions. However, as concentration increases, further suppression of brain functions produce the classic symptoms of intoxication: slurred speech, unsteady walk, disturbed sensory perceptions, and inability to react quickly. At very high concentrations, ethanol produces general anesthesia; a highly intoxicated person will be asleep and very difficult to wake, and if awakened, unable to move voluntarily.

Alcohol levels in the brain are difficult to measure, and so blood alcohol levels are used to assess degree of intoxication. Most people begin to show measurable mental impairment at around 0.05 percent blood alcohol. At around 0.10 percent, mental impairment will show obvious physical signs, such as an unsteady walk. Slurred speech shows up at around 0.15 percent. Unconsciousness results by 0.4 percent. Above 0.5 percent, the breathing center of the brain or the beating action of the heart can be anesthetized, resulting in death. Reaching this level of blood alcohol by ingestion is unlikely, however. In a 150-pound human, it would require rapid consumption of a fifth gallon of a 100-proof spirit.

A Personal Note from Prof. Shakhashiri

Serious impediments to learning, personal growth and development, and responsible behavior can be caused by alcohol and substance abuse. The notorious national reputation of the UW-Madison campus in this regard is shameful. I urge you to follow the guidance provided by the Office of the Dean of Students and other officials to help achieve a drug-free environment and to exercise responsible and lawful use of alcoholic beverages.

Back to Chemical of the Week.

Methane

From Wikipedia, the free encyclopedia.

The simplest hydrocarbon, **methane**, is a gas with a chemical formula of CH_4.

A principal component of natural gas, methane is a significant fuel. Burning one molecule of methane in the presence of oxygen releases one molecule of CO_2 (carbon dioxide) and two molecules of H_2O (water):

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

Due to the heat and attack by the active species, the methane reacts to a methyl radical (CH_3), which reacts to formaldehyde (HCHO *or* H_2CO). The formaldehyde reacts to a formal radical (HCO), which then forms carbon monoxide (CO). The process is called oxidative pyrolysis:

$$CH_4 + O_2 \rightarrow CO + H_2 + H_2O$$

Following oxidative pyrolysis, the H_2 oxidizes, forming H_2O, replenishing the active species, and releasing heat. This occurs very quickly, usually in less than a millisecond.

$$H_2 + 1/2\ O_2 \rightarrow H_2O$$

Finally, the CO oxidizes, forming CO_2 and releasing more heat. This process is generally slower than the other chemical steps, and typically requires a few to several milliseconds to occur.

$$CO + 1/2\ O_2 \rightarrow CO_2$$

The strength of the carbon-hydrogen covalent bond in methane is among the strongest in all hydrocarbons, and thus its use as a chemical feedstock is limited. The search for catalysts which can facilitate C-H bond activation in methane and other low alkanes is an area of research with considerable industrial significance.

Methane on Earth

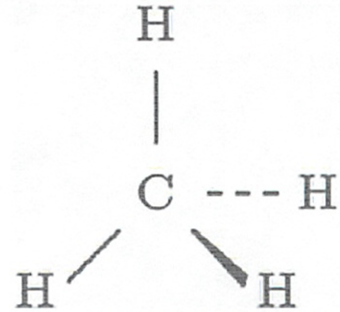
Pure methane is odorless, but when used as a fuel is usually mixed with small quantities of strongly-smelling sulfur compounds such as ethyl mercaptan to enable the detection of leaks.

Methane is a greenhouse gas with a global warming potential of 21 (meaning that it has 21 times the warming ability of carbon dioxide).

Principal sources are

- decomposition of organic wastes
- natural sources (marshes): 23 %
- fossil fuel extraction: 20 %, see Coal bed methane extraction
- the processes of digestion in animals (cattle): 17 %
- bacteria found in rice plantations: 12 %

Properties



General	
Name	**Methane**
Lewis Structure:	
Chemical formula	CH_4
Formula weight	16.04 amu
Synonyms	Marsh gas; Methyl hydride
CAS number	74-82-8
Phase behavior	
Melting point	90.6 K (-182.5°C)
Boiling point	111.55 K (-161.6°C)
Triple point	90.67 K (-182.48°C) 0.117 bar
Critical point	190.6 K (-82.6°C) 46 bar
$\Delta_{fus}H$	1.1 kJ/mol
$\Delta_{vap}H$	8.17 kJ/mol
Gas properties	
$\Delta_f H^0_{gas}$	-74.87 kJ/mol
S^0_{gas}	188 J/mol·K

C

- biomass anaerobic heating or combustion

60% of the world emissions are from sources affected by humans. They come primarily from agricultural and other human activities. During the past 200 years, the concentration of this gas in the atmosphere doubled, passing from 0.8 to 1.7 ppm.

Methane is extracted from geological deposits as a "fossil fuel" which is associated with other hydrocarbon fuels. The origin of such deposits are being studied.

Methane can be created and used industrially, and perhaps in nature, by chemical reactions such as the Sabatier process, Fischer-Tropsch process, and steam reforming. Similar gases and materials are often present in geologic and volcanic processes.

Methane is also classified as a biogas because it can be created by the (anaerobic) decomposition of certain organic matters.

At high pressures, such as are found on the bottom of the ocean, methane forms a solid clathrate with water. An unknown but possibly very large quantity of methane is trapped in this form in ocean sediments. The sudden release of large volumes of methane from such sediments into the atmosphere has been suggested as a possible cause for rapid global warming events in the earth's distant past, such as the Paleocene-Eocene thermal maximum of 55 million years ago.

p	35.69 J/mol·K
Safety	
Acute effects	Asphyxia; in severe cases unconsciousness, cardiac arrest or CNS injury. The compound is transported as a cryogenic liquid, exposure to this will obviously cause frostbite.
Chronic effects	???
Flash point	-188°C
Autoignition temperature	600°C
Explosive limits	5-15%
More info	
Properties	NIST WebBook (*http://webbook.nist.gov/cgi/cbook.cgi?ID=C74828&Units=SI*)
MSDS	Hazardous Chemical Database (*http://ull.chemistry.uakron.edu/erd/chemicals1/7/6745.html*)
SI units were used where possible. Unless otherwise stated, standard conditions were used. Disclaimer and references	

Methane not on Earth

Methane has been detected or is believed to exist in several locations of the solar system. It is believed to have been created by abiotic processes, with the possible exception of Mars.

- Jupiter
- Mars
- Saturn
  - Iapetus
  - Titan
- Neptune
  - Triton
- Uranus
  - Ariel
  - Miranda
  - Oberon
  - Titania
  - Umbriel
- Comet Halley
- Comet Hyakutake

Traces of methane gas are present in the thin atmosphere of the Earth's Moon.

Methane has also been detected in interstellar clouds.

See also

- alkane, a type of hydrocarbon of which methane is simplest member.
- methane clathrate, form of water ice which contains methane.
- methanogen, archaea that produce methane as a metabolic by-product.
- methanogenesis, the formation of methane by microbes.
- methanotroph, bacteria that are able to grow using methane as their only source of carbon and energy.
- methyl group, a functional group similar to methane

Alkanes

methane CH_4	ethane C_2H_6	propane C_3H_8	butane C_4H_{10}	pentane C_5H_{12}	hexane C_6H_{14}
heptane C_7H_{16}	octane C_8H_{18}	nonane C_9H_{20}	decane $C_{10}H_{22}$	undecane $C_{11}H_{24}$	dodecane $C_{12}H_{26}$
tridecane $C_{13}H_{28}$	tetradecane $C_{14}H_{30}$	pentadecane $C_{15}H_{32}$	hexadecane $C_{16}H_{34}$	heptadecane $C_{17}H_{36}$	octadecane $C_{18}H_{38}$
nonadecane $C_{19}H_{40}$	eicosane $C_{20}H_{42}$	heneicosane $C_{21}H_{44}$	docosane $C_{22}H_{46}$	tricosane $C_{23}H_{48}$	tetracosane $C_{24}H_{50}$
pentacosane $C_{25}H_{52}$	hexacosane $C_{26}H_{54}$	heptacosane $C_{27}H_{56}$	octacosane $C_{28}H_{58}$	nonacosane $C_{29}H_{60}$	triacontane $C_{30}H_{62}$
hentriacontane $C_{31}H_{64}$	dotriacontane $C_{32}H_{66}$	tritriacontane $C_{33}H_{68}$	tetratriacontane $C_{34}H_{70}$	pentatriacontane $C_{35}H_{72}$	hexatriacontane $C_{36}H_{74}$

Categories: Alkanes | Greenhouse gases

Chemical of the Week

METHANE

Methane is a colorless, odorless gas with a wide distribution in nature. It is the principalcomponent of natural gas, a mixture containing about 75% CH_4, 15% ethane (C_2H_6), and 5% other hydrocarbons, such as propane (C_3H_8) and butane(C_4H_{10}). The "firedamp" of coal mines is chiefly methane. Anaerobic bacterial decomposition of plant and animalmatter, such as occurs under water, produces marsh gas, which is also methane.

At room temperature, methane is a gas less dense than air. It melts at –183°C and boils at –164°C. It is not very soluble in water. Methane is combustible, and mixtures of about5 to 15 percent in air are explosive. Methane is not toxic when inhaled, but it can produce suffocation by reducing the concentration of oxygen inhaled. A trace amount of smelly organic sulfur compounds (*tertiary*-butyl mercaptan, $(CH_3)_3CSH$ anddimethyl sulfide, $CH_3–S–CH_3$) is added togive commercial natural gas a detectable odor. This is done to make gasleaks readily detectible. An undetected gas leak could result in an explosion or asphyxiation. (The attached scratch-and-sniff sheet from Madison Gas & Electric Company is for your use outside of class.)

Methane is synthesized commercially by the distillation of bituminous coal and by heating a mixture of carbon and hydrogen. It can be produced in the laboratory by heating sodium acetate with sodium hydroxide and by the reaction of aluminum carbide(Al_4C_3) with water.

In the chemical industry, methane is a raw material for the manufacture of methanol (CH_3OH), formaldehyde (CH_2O), nitromethane (CH_3NO_2), chloroform ($CHCl_3$), carbontetrachloride (CCl_4), and some freons (compounds containing carbon and fluorine, and perhaps chlorine and hydrogen). The reactions of methane with chlorine and fluorine are triggered by light. When exposed to bright visible light, mixtures of methane with chlorine or fluorine react explosively.

The principal use of methane is as a fuel. The combustion of methane is highly exothermic.

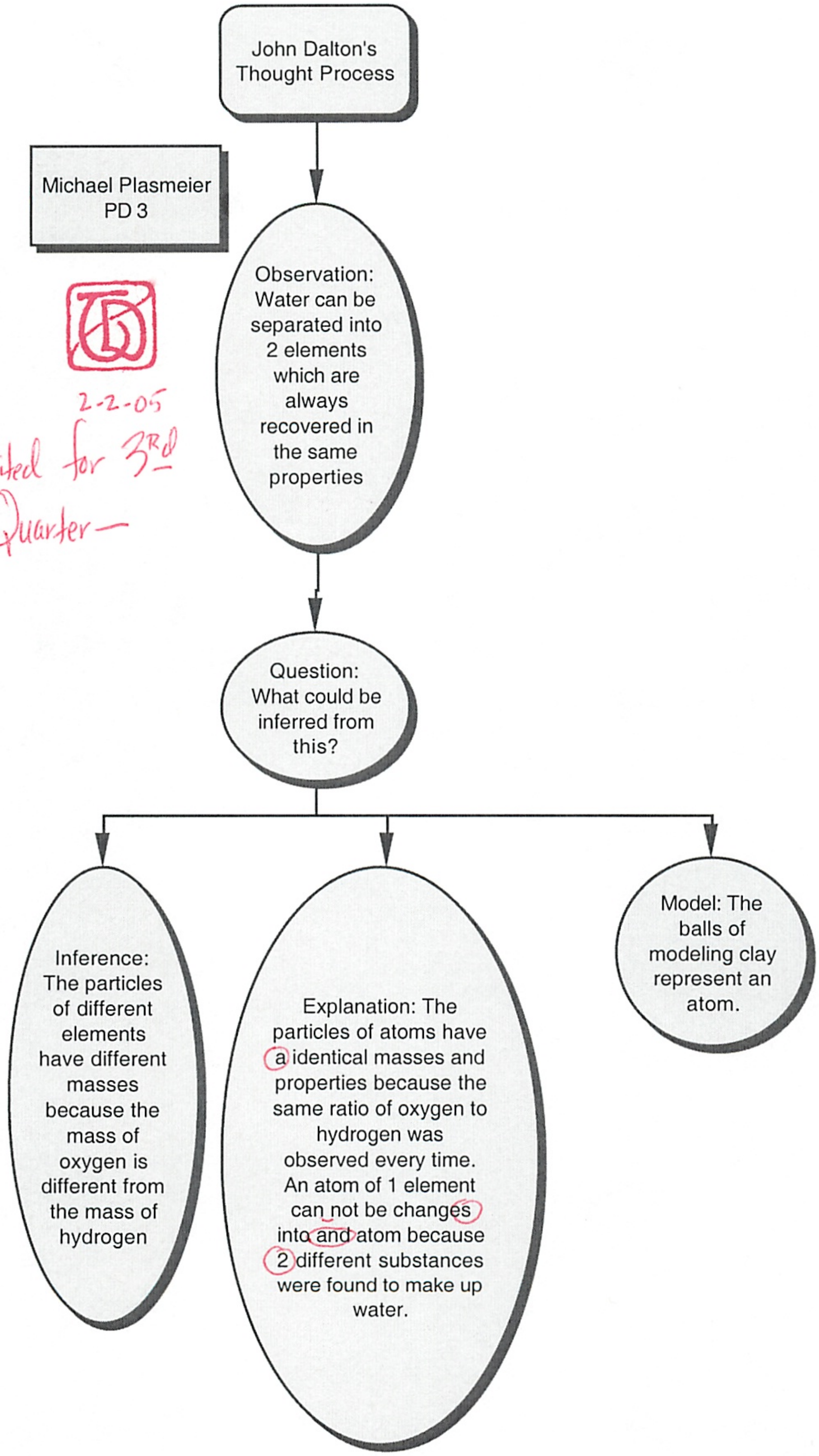
$$CH_4(g) + 2\,O_2(g) \longrightarrow CO_2(g) + 2\,H_2O(l) \qquad \Delta H = -891\ kJ$$

The energy released by the combustion of methane, in the form of natural gas, is used directly to heat homes and commercial buildings. It is also used in the generation of electric power. During the past decade natural gas accounted for about 1/5 of the total energy consumption worldwide, and about 1/3 in the United States. The cost of natural gas to Wisconsin consumers is regulated by the State Public Service Commission. Madison Gas Electric Company currently charges its residential consumers about $0.66 per 100 cubic feet.

Natural gas occurs in reservoirs beneath the surface of the earth. It is often found in conjunction with petroleum deposits. Before it is distributed, natural gas usually undergoes some sort of processing. Usually, the heavier hydrocarbons (propane and butane) are removed and marketed separately. Non-hydrocarbon gases, such as hydrogen sulfide, must also be removed. The cleaned gas is then distributed throughout the country through thousands of miles of pipeline. Local utility companies add an odorant before delivering the gas to their customers.

Some methane is manufactured by the distillation of coal. Coal is a combustible rock formed from the remains of decayedvegetation. It is the only rock containing significant amounts of carbon. The elemental composition of coal varies between 60% and 95%carbon. Coal also contains hydrogen and oxygen, with small concentrations of nitrogen, chlorine, sulfur, and several metals. Coals are classified by the amount of volatile material they contain, that is,by how much of the mass is vaporized when the coal is heated to about 900°C in the absence of air. Coal that contains more than 15% volatile material is called bituminous coal. Substances released from bituminous coal when it is distilled, in addition to methane, include water, carbon dioxide, ammonia, benzene, toluene, naphthalene, and anthracene. In addition, the distillation also yields oils, tars, and sulfur-containing products. The non-volatile component of coal, which remains after distillation, is coke. Coke is almost pure carbon and isan excellent fuel. However, it may contain metals, such as arsenic andlead, that can be serious pollutants if the combustion products arereleased into the atmosphere.

Back to Chemical of the Week.



2-2-05
Credited for 3RD Quarter—

Name Michael Plasmeier Homeroom 130 Period 3

More on the Particle Theory

All matter is made of particles! that are in motion

1. **Why do we feel hotter on hot, humid days than on hot, dry days. Use the particle model of matter to explain your reasoning.**

The humidy level has something to do with this. On humid days, water droplets evaporate in to the air. Because all matter is made of particles, the water particls mix with the oxygen and other particles in the air. Our body can somehow feel this extra water. ? makes sweat evaporate? so it makes us feel hotter

Water does not evaporate off our skin as quickly

2. The following story contains at least five observations that can be explained with the particle model. Underline them

"One more dive and then we gotta go. We can't be late for dinner again. Mom'll get mad." Ben and Josh each dove off the cliff, neatly splitting the water. "It shouldn't take too long to dry in this sun," said Ben. "Oh great," groaned Josh. "My front tire's flat. Guess I should've filled it before we left. We'll have to walk it to the gas station." With the tire pumped up, the brothers raced home to make up for lost time. The breeze felt cool on their damp skin and hair. When they got home, their mother said, "Put your wet things in the dryer and come eat. I want one of you to mow the grass before it gets dark, while it's still dry. There'll be too much dew to mow in the morning." "No prob, Mom," said Josh, "Ben'll do it. Say, dinner smells great."

splitting the water water has to be made of particls for it to move so neatly, cutting in half

particles of water move

dry in sun the water will evaporate in the hot sun, which can be explained as the particls bloing away

water gets heated by the sun

tire filled because particles of gas can be compressed

front tire flat - air has to be made of particles for it to go out the small hole in the tire.

breeze - the wind of the breeze evaporates the water particles?

dew - the dew on the grass is condensed water.

Particles leave food and diffuse through room letting us smell

3. A balloon had a mass of 6.2 g and a volume of 2.3 L. What might have been done to the balloon to bring about the changes shown in the chart?

forgot 1st one

6.2g 2.3L

(1st)	Mass	Volume
a	6.2 g	3.2 L
b	6.5 g	2.9 L
c	6.0 g	2.5 L

In ballons b they let some air out and taped a .5 g weight. In C they removed the weight.

1st → B filled w/ .5g/L substance

They could also have filled each ballon with a different substance

1st → a heated it

1st → C less dence substance took out air + heat it

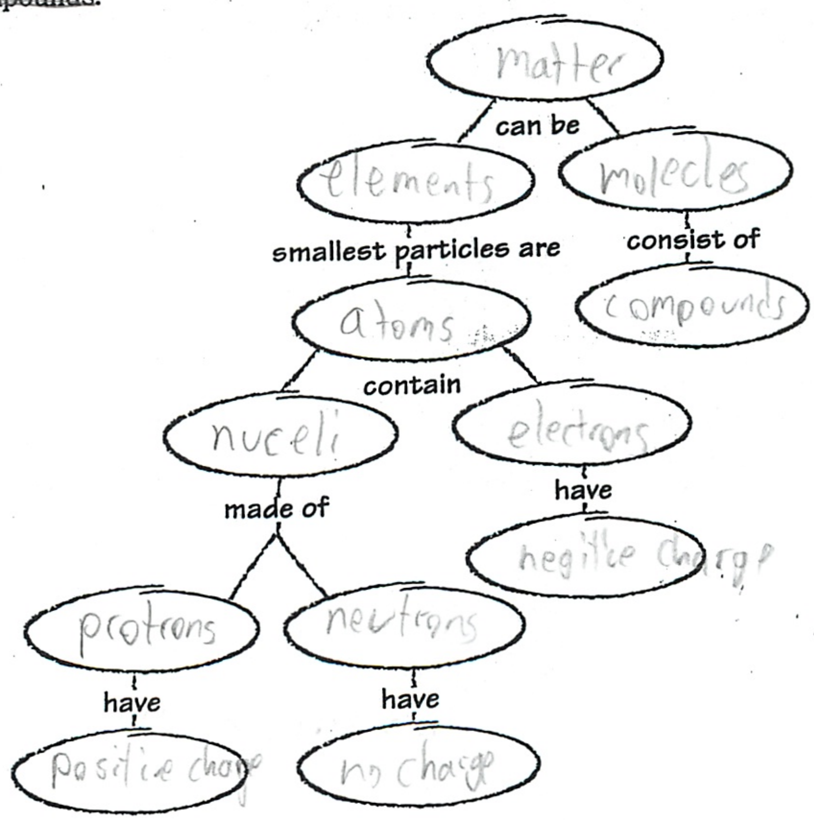
4. Air fresheners are often placed in different areas of a home, such as kitchens, bathrooms, and basements. Over a period of weeks, the fragrant part of the air freshener gradually disappears. What happens to it? Use the particle model to explain.

? I have he experiance w/ solid air freshners

The particles of the air freshener dislove into the air and the air disperses into the rooms of the house.

sublimes

5. concept map Complete the concept map below using the following words: electrons, elements, atoms, nuclei, molecules, matter, neutrons, negative charge, protons, no charge, positive charge, and compounds.



Physical Changes

Changes of state such as melting or boiling are physical changes and are generally easy to reverse though the end product may not always look exactly the same as the starting material. In physical changes no new materials are formed and the particles do not change apart from gaining or losing energy. Melted wax solidifies when cooled but unless it is shaped or moulded it will not be the same shape as at the start. On a microscopic level although the same particles are present they may be in different places within the solid.

Ice is made up of particles of water. When it melts the water which is formed is made up the same water particles and when it boils the steam is also made up of the same water particles. Particles stay the same unless there is a chemical change whether the matter is solid, liquid or gas. Only their arrangement, energy and movement changes.

When substances change state there is no change in mass so if 100 g of ice is melted 100g of water are formed this will boil to form 100g of steam (this is called "conservation of mass"). If this steam could be collected, cooled and condensed it would form 100g of water which could be frozen to give 100g of ice. Children often think that solids get lighter when they melt as liquids are lighter than solids.

Name Michael Plasmeier Period 3

THE SIZE OF PARTICLES

You pour muddy water through a filter and clear water comes out. You notice that solid material has collected on the filter. What do these observations tell you about the relative size of the particles that make up the mud and the water?

The particles of rock and mud are large then the particles of water

ever though atoms are same size, # of atoms determin particle size

like a lead ball vs. Strophome ball of same size

All atoms are about the same size, but vary widely in mass. The unit typically used to express mass of an atom is called the ATOMIC MASS UNIT, or amu. There are 602 billion trillion (6.02×10^{23}) amu in 1 gram of matter. This number is called Avogadro's number.

DIRECTIONS: MAKE A CHART WITH THE FOLLOWING COLUMNS: Compound Name, Mass, and Total Number of Atoms. Fill out the chart for each of the compounds found in the table on page 97. Use the back of this paper.

Compound	Mass in g	Total # of Atoms
Water	18	3
Hyrogen Sulfide	34	3
Carbon Dioxide	44	3
Methane	16	5
Butane	58	14
Ammonia	17	4
Glucose	180	24
Ethal Akhol	46	9

Name Michael Plasmeier Period 3

Directions: Read SciencePlus textbook page S7. Answer each question below.

1. How does a water molecule form?

A water molocule forms when 2 hyrogens Chemiclly bond with an oxygen atom

2. Sketch a water model.

3. How would you describe the oxygen side and hydrogen side of a water molecule? Explain.

They have a slight electral charge like the one mentioned above. the Hyrogen Side is slightly positive ant the oxygen Side is sligly negitive

A molecule that has a slight charge is called a polor molecue. The polarty allows the molecues to stick together.

4. Why is water considered a good solvent?

Because the polarty allows it to easly bond with the molecues of other substances (or atoms)

Name Michael Plasmeier Date ____________ Class ____________

Name This Diagram!

Complete the diagram below by following these instructions.

a. Come up with a title for the diagram that summarizes the diagram and is accurate, descriptive, and catchy!

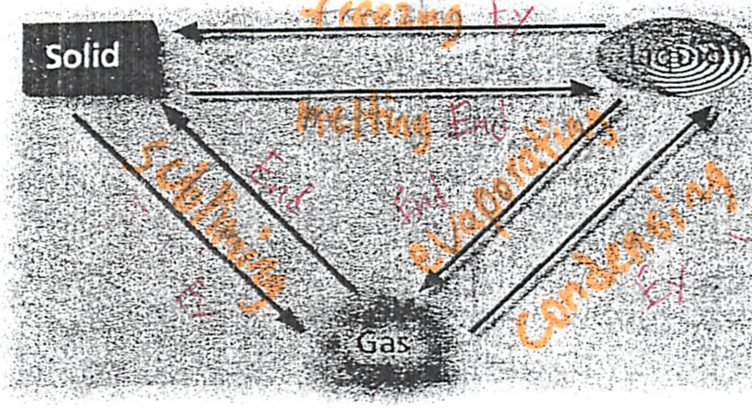
b. Place one of the following words on each arrow:

- melting
- freezing
- condensing
- vaporizing (or evaporating)
- subliming (changing directly from solid to gas and vice versa)

c. Label each arrow as signifying either an endothermic or exothermic change.

The flow of states / The 3 Statly States of Matter

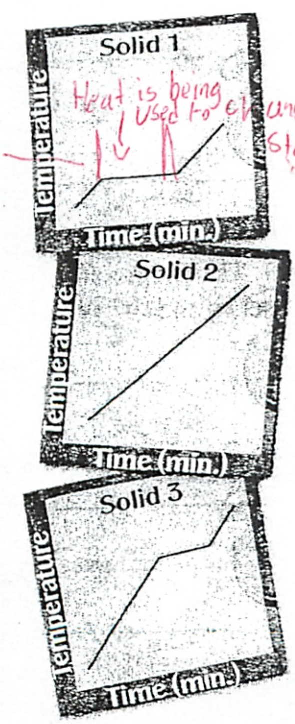
Changes of State



Endothermic
In Heat
takeing heat in
Exothermic
Out heat
loosing heat

Solid Evidence

Three solids were heated, and their temperatures were plotted against the heating time (shown at left).



a. Which substance(s) melted when heated? How do you know?

~~Solid 2 becuse it does not stop at 1 tempature~~ 1 and 3 because it was absorbing heat before chaning state
Using energy to chane state, not become hotter

b. Which substance has the highest melting point?

~~3 The 2nd point going up is higest~~
2 has higest melting point because hasn't melted yet

c. Which substance would seem to have the strongest forces of attraction between its particles?

~~1 It does not melt easley~~
2 for same reason as b

Name Michael Plasmeier Period 3 Date 2/7

Seeing is Believing

1. Place a candle inside a large beaker, holding the candle in place with a piece of modeling clay. The candle should be shorter than the beaker.

2. Mix 50 mL of baking soda (50 g) with 100 mL of water, and then carefully pour this mixture around the candle so that there is about 3 cm of candle above the surface of the mixture.

3. Light the candle.

Question

How might the candle be put out?

The vinegar will cause the baking soda to bubble up

4. Fill a dropper with 5 to 10 mL of vinegar. Carefully squirt the vinegar down the side of the candle. Be sure that the stream of vinegar does not touch the candle's flame. Use more vinegar if necessary.

The mixture never touched the candle. It must have been the gas released as a by product from the baking soda and viniger being mixed

Observation: when the viniger was added to the baking soda + viniger the mixture bubled and the flames went out.

Inferences: The bubble were carbon dioxide

Inferences

The carbon dioxide displaced oxygen in beaker and make flame go out

Prove existance of what you cant see

Even though you cant see the gas around the wick, you can observe the effect of gass on the flame

Both o + CO^2 are gas; How does particle theory explain this

A chem reaction between baking soda + viniger partices produced CO^2. The heaver CO^2 particles sank and pushed the lighter o particles out of the jar

Name ______________________ Date __________ Class __________

EXPLORATION 2

Chapter 5
Exploration Worksheet

Sugar and Starch Molecules, page 99

Your goal	to investigate the properties of sugar and starch molecules	Safety Alert! 

Starch and sugar are two compounds that consist of the same elements, just arranged differently. The molecules of starch and sugar are made up of carbon, hydrogen, and oxygen atoms.

After performing the following experiment, name three differences in the properties of sugar and starch.

You Will Need

- a graduated cylinder
- 5 mL of cornstarch
- 5 mL of dextrose
- a jar with a lid
- a stirring rod
- a large beaker
- 100 mL of hot water
- an egg
- a straight pin
- iodine solution
- Benedict's solution
- a watch or clock
- a hot plate
- a hot-water bath
- 2 test tubes
- an oven mitt or test-tube tongs
- an eyedropper
- latex gloves

What to Do

1. Mix 5 mL of cornstarch with 5 mL of dextrose. (Dextrose is a sugar.) Add this mixture to 100 mL of hot water in a beaker. Stir.
2. Crack an egg in half, and save the larger end of the shell, which contains the air sac.
3. Using a straight pin, carefully remove part of the large end of the shell to expose the air sac. Be careful not to puncture the air-sac membrane. (You will, however, need to break the membrane that lies flush with the eggshell.)
4. Pour 5–10 mL of water into the shell, and float the shell in the sugar-cornstarch-water mixture.
5. After 15 minutes, pour half of the liquid in the eggshell into a test tube. Pour the remaining half into another test tube.
6. Test the liquid in one test tube with a few drops of iodine solution. A blue color indicates the presence of starch. Did starch molecules move through the air-sac membrane into the liquid in the shell?
7. Test the remaining liquid by adding eight drops of Benedict's solution to the second test tube.

   Caution: Benedict's solution can irritate the skin. Handle with care.

   Heat the liquid *gently* in a hot-water bath to avoid splattering. Use an oven mitt or test-tube tongs to handle the hot test tube. A red or yellow color indicates the presence of sugar. Did sugar molecules pass through the air-sac membrane?

Name Michael Plasmeier Period 3 Date 2/7/05

Particles in Motion
Science Assignment
Ms. D'Andrea

ANSWER THE FOLLOWING QUESTIONS IN YOUR SCIENCE LOG, YOU CAN FIND THE ANSWERS IN THE SOURCEBOOK SECTION OF SCIENCEPLUS, PAGES S26-S31.

1. Explain what Joseph Black observed about water when exposed to temperature changes.

The water would warm but when it began to boil it's tempature would stop rising even with more heat.

Temp stays at boiling point

2. Why is it impossible under normal conditions to raise the temperature of boiling water abo~~ut~~ve 100°C?

The energy from the heat is used to change the state of the particles to a gas

at 100°C for water.

3. How do particles of liquid water differ from particles of water vapor?

The particles have the atoms in fixed rigid patterns as a solid and are (more) loose and bounce around as a gas.

and not as tight as water

water: particles still touch

gas: little cohesion big distance between particles

~~Water as liquid~~ gas molecules have more energy

4. Look at the picture on page S27 and answer the following questions:
   a. Is the surface of the water level? Explain.
   b. Why does the water move up the side of the cylinder?
   c. What is the curve of the water called?
   d. Why does the water surface remain unbroken?

-not level

a: No it is slightly reversed curved

exgarate

(b) because of adhersion to glass

(sticks)

(unlike particles)

C: meniscus

d: surface tention: cohorsion (like particles)

5. Compare and contrast the cohesive bonds of solids and liquids.

The bonds of cohesion in solids are stronger because in order for it to be a solid, it needs to be stronger.

6. What example does the book give for adhesion. Explain.

It's like glue sticking to paper because its between 2 unlike surfaces

7. What is surface tension?

Cohesion between the like particles

Like skin at top of water formed by cohension

* Particles at the top stick together

8. Give an example that explains the kinetic molecular theory of matter.

A crystal has particles that vibrate, but don't move freely

Water can be pored into a glass and occupy the same volume

9. Describe the textbook's example of diffusion.

Place a drop of ink into water. Ink particles move around untill water molecues are equally distrubuted

10. What happens when solids and liquids cool?

Molecues loose energy, slow down. Cohesion draws the particles together

Michael Plasmeier

THE PERIODIC TABLE

(Pages 116 and 117 of Focus on Physical Science)

1. List information found in any box of the periodic table.

Atomic #

Atomic Symbol

Average Atomic Mass

Element name

2. Where are the metals located?

~~1, 2, 13, 14, 15, 16~~ left side

IA → VIA

3. Where are the nonmetals located?

~~14 + 15 + 16 + 17~~ Right side

IIIA → VIIA

4. What are the elements in Groups 3 through 12 called?

transition ~~Metals~~ / Elements

5. What do we call the letter or group of letters that represents each element?

Chemical Element / Atomic Symbol

6. What name is given to the elements in Group 18?

Noble Gasses

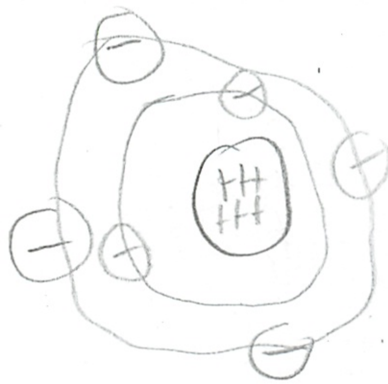
7. What name is given to all **vertical column** in this table?

Groups / Familes

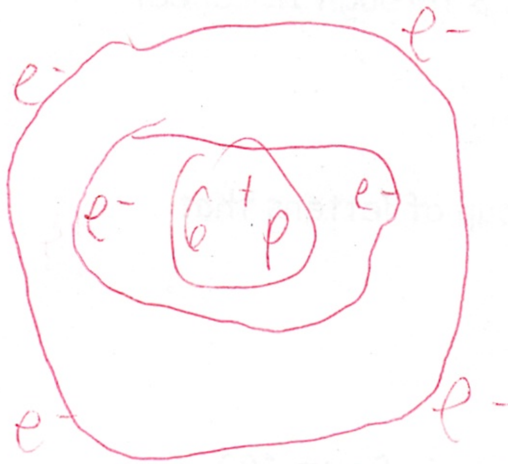
8. What name is given to each **horizontal row** in this table?

Periods

Draw an electron shell diagram for Carbon below:



12 a.m.u.



atom is neutral as all atoms on table are

atomic # is the number of protons it has.

Same number of protons as electrons

Atomic mass is in amu. (atomic mass units)

6p + 6n = 12amu

6+6=12

Name Michael Plasmeier
Period 3
Date 2/11

Sweet Science (Page 8)

Vocabulary Challenge

Match each numbered word or group of words with its description. Write the letter of the correct description in the blank provided.

J 1. alkaloid
G 2. caffeine
F 3. chocolate solids
B 4. tempering
C 5. theobromine
H 6. phenylethylamine
D 7. fermentation
I 8. cocoa butter
A 9. nib
E 10. anandamide

A. the inner part of a cocoa bean
B. a process that gives chocolate its luster and a clean snap when broken
C. a mild stimulant that shares part of its name with the scientific term for the cacao tree
D. a process that releases gas bubbles in bread dough
E. a brain chemical that seems to play a role in regulating mood and pain
F. compounds that give chocolate its distinctive flavor and brown color
G. a stimulant in tea
H. a brain chemical that increases alertness and relieves depression
I. a substance that is an ingredient in many lipsticks and lotions
J. a bitter-tasting compound in cocoa beans

Name Michael Plasmeier Date ________ Class ________

Credit

2-21-05

Chapter 5
Review Worksheet

Challenge Your Thinking

1. Invisible Aerobics

The first column of the table below lists some words that describe the ways particles may move. Which state of matter—solid, liquid, or gas—is most likely to exhibit each kind of movement? Suggest an everyday event that is similar to the way particles move. One has been done for you.

Word	State of matter	Your analogy
Wriggling	Solid	Like students wriggling while sitting in their seats
Vibrating	Solid	Vibration machine
Tumbling	Gas	Dryer
Bouncing	Solid	Like a ball bouncing
Flying	Gas	An airplane
Shaking	Solid	Like Dice in your hands
Whirling	Liquid	Airplane propelers
Sliding	Solid	Sliding Door

2. Changes in Behavior

The following pictures illustrate the behavior of particles in solids, liquids, and gases.

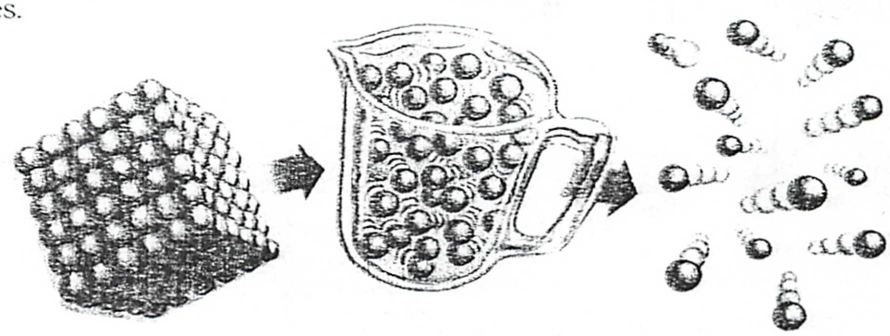


Illustration also on page 105 of your textbook

Write a sentence or two that would explain to a fifth-grader what is happening in each picture.

The little balls that make up substances sometimes stick together. Sometimes they are held in a jar and sometimes they fly all over the place.

Name ______________________ Date ____________ Class ____________

All matter is made of particles

EXPLORATION 6

Chapter 5
Exploration Worksheet

All particles are alwas in motion.

Particles on the Move, page 103

Cooperative Learning Activity		Safety Alert!
Group size	3 to 4 students	
Group goal	to explain what happens to the particles of a substance during heating and cooling	
Individual responsibility	Each group member should choose a role such as designer, checker, presenter, or materials manager.	
Individual accountability	Each member of your group should be able to complete the section Expanding the Model on page 104 of your textbook.	

Chapter 5

Your model of matter is becoming more and more useful because it can explain more observations. Now you will make a few more observations of the behavior of matter. In each instance, explain your observations in terms of what the particles in the solid, liquid, or gas are doing.

You Will Need

- food coloring
- an eyedropper
- ice water
- hot water
- a balloon
- a plastic soft-drink bottle
- an ice chest with ice
- rubbing alcohol
- 2 microscope slides
- matches
- test-tube tongs
- a beaker
- cotton balls
- a metal lid from a jar
- perfume
- a candle

Station 1

What to Do

1. Place a drop of food coloring into very cold water and another drop into very hot water.
2. Explain the difference in behavior.

The hot water dissipates the drop much faster and evenly then the cold water

Diffusion

hot water is darker after 1-2 min

Hot particles move faster

heated particles move faster

Name ______________________ Date ____________ Class ____________

Station 2

1. Place a balloon over the mouth of a 2 L or 3 L plastic soft-drink bottle.
2. Place the bottle into a container of hot water for a few minutes.
3. Now quickly place it in a container of ice water.
4. Use the particle model to explain what happens.

The hot water made the ballon expand. When it was put in cold water, the ballon deflates again.

* The hot water make the particles move faster and expand

expansion

When the bottle is in hot water, the air particles move faster + expand

when in ice, air particles slow down + move closer together + cause ballone to defate

Station 3

1. Heat a microscope slide with a match.
2. After extinguishing the flame, place one drop of alcohol on the heated slide and one drop on an unheated slide.
3. Using the particle model, explain the differences you observe.

Hot: Rubbing achole spread out (evaporates)
Cold: Rubbing achole stayed as drop

* The heat made the achole expand because the particles move faster

evaporation

Station 4

1. Pour ice water into a beaker.
2. Now breathe on the side of the beaker.
3. What do you observe? Explain this observation in terms of what you think the water molecules in your breath are doing.

It got foggy on the side

* The differbrent temps make the water you breath out condenca against the cold water

condensation

Name ____________ Date ________ Class ________

Station 5

difusion
evaporation

1. Place a cotton ball on a metal lid.
2. Add a few drops of perfume to the cotton.
3. From how far away can you smell the perfume?

The whole room in approx 2 min
bit over a m

4. What do you think the liquid particles that make up the perfume are doing?

Spreading out smelled threought the room
Eventully the perfume could be moving farther apart as they
The particles of perfume are diffuse through the air
Change to gas and

Station 6

1. Observe a burning candle.
2. What forms at the top of the candle (not the top of the flame)?

melted wax

3. What happens after the candle is blown out?

the wax hardens

melting + Solidification

4. Explain these observations in terms of what the particles of wax are doing.

They take in energy (endothermic change) and turn to a liquid they then loose energy (exothermic change) and turn solid when you blow it out.

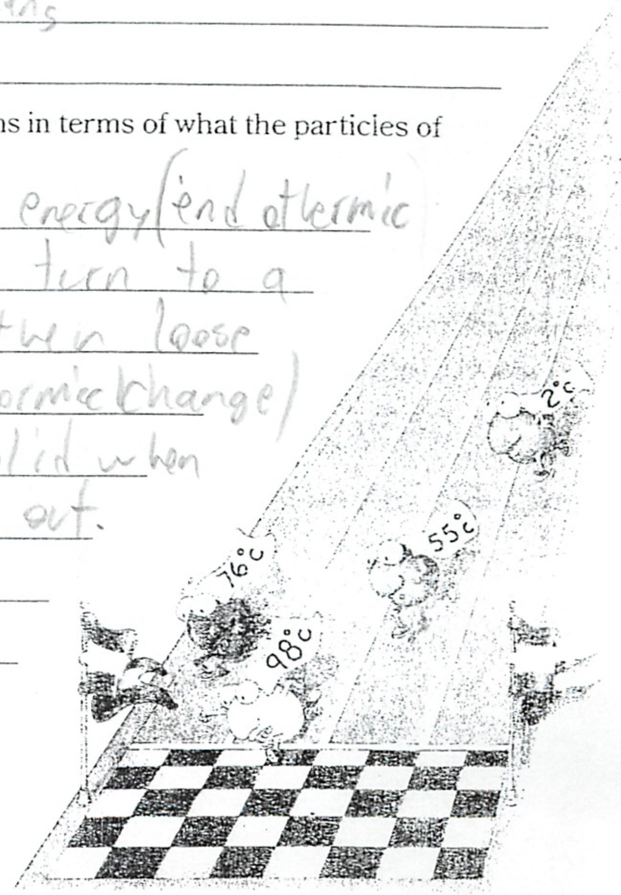


Illustration also on page 104 of your textbook

CHEMISTRY THAT APPLIES