

Answers

Will the test just look like these problems? No! It can have anything we learned. Everything we learn is important. Review the original notes and worksheets.

1. Write the seven elements that usually form diatomic molecules when they are not in a compound:

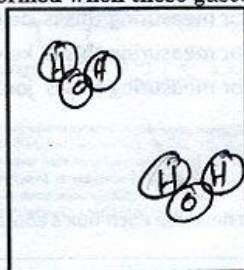
H₂, N₂, O₂, F₂, Cl₂, Br₂, I₂

2. Sketch a particle diagram representing a mixture of hydrogen and oxygen gases. Sketch a particle diagram for the compound formed when these gases react.

Must be diatomic!



mixture

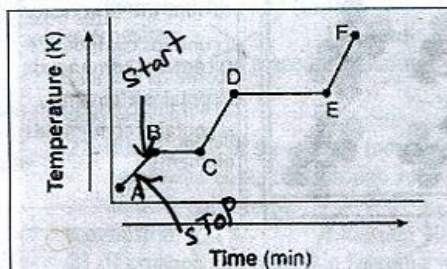


compound

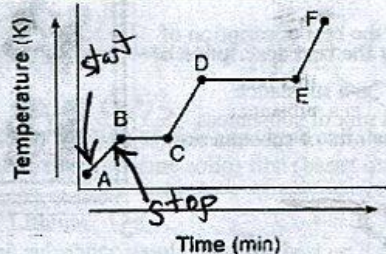
3. Write 'intrinsic' next to any property that is intrinsic.

- a) color intrinsic
b) mass -
c) density intrinsic
d) shape -

- e) melting point intrinsic
f) magnetic (ability to be attracted to a magnet) intrinsic



4. Write *start* and write *stop* to indicate what will happen to hot iron when you drop it in cold water



5. Write *start* and write *stop* to indicate what will happen cold water when hot metal is dropped into it.

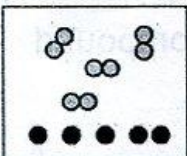
6. Decide whether heating (we called it Q) is entering or leaving the object in bold..

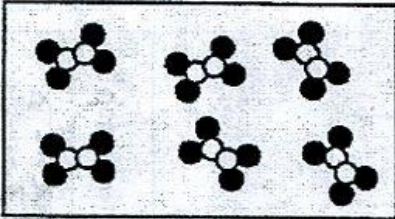
- a) An ice cube is placed in a cup of hot **coffee** LEAVING
 An **ice cube** is placed in a cup of hot coffee ENTERING
 b) A pot of **hot tea** is sealed into a well-insulated thermos LEAVING
 c) Some **cold cream** is poured into a cup of hot coffee ENTERING
 d) You blow **air** across a bowl of hot soup ENTERING
 e) **You jump** into an ice cold pond LEAVING

For each item below indicate whether it applies to HEAT or TEMPERATURE

7. **temp** Can be measured by inserting a thermometer
 8. **heat** Can be measured by holding water nearby and then multiplying $mass_{water} \times C_{p_{water}} \times \Delta T_{water}$
 9.
 10. **temp** one common unit for measuring this is degrees celsius
 11. **temp** one common unit for measuring this is kelvins
 12. **heat** one common unit for measuring this is joules


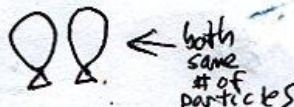
18. Check the appropriate box to describe each box's contents

Mark the best description of this box: <input type="checkbox"/> a substance <input checked="" type="checkbox"/> mix of substances		Mark the best description of this box: <input type="checkbox"/> contains compounds <input checked="" type="checkbox"/> contains elements <input type="checkbox"/> contains compounds and elements
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18. What is Avogadro's principle?

Same sized gas volumes
 contain same number of particles (if at same pressure + temperature)

19. What is Proust's Law? If something is a substance
Every occurrence of that substance will
have the same percent by weight for each element.

Next to each write physical change or chemical to indicate which type of change is being described.

13. Pancakes cooking on a griddle chemical [because new substance with new properties forms. New color, New flavor]
14. Grass growing in a lawn chemical
15. A tire is inflated with air. physical
16. Food is digested in the stomach. chemical
17. Water is absorbed by a paper towel. physical

Magnesium — (Magnesia, district in Thessaly) Mg; at. wt. 24.305; at. no. 12; m.p. 648.8±0.5°C; b.p. 1090°C; sp. gr. 1.738 (20°C); valence 2. Compounds of magnesium have long been known. Black recognized magnesium as an element in 1755. It was isolated by Davy in 1808, and prepared in coherent form by Bussy in 1831. Magnesium is the eighth most abundant element in the earth's crust. It does not occur uncombined, but is found in large deposits in the form of magnesite, dolomite, and other minerals. The metal is now principally obtained in the U.S. by electrolysis of fused magnesium chloride derived from brines.

Lithium is used in many cells and storage batteries. The metal is priced at about \$20/lb.

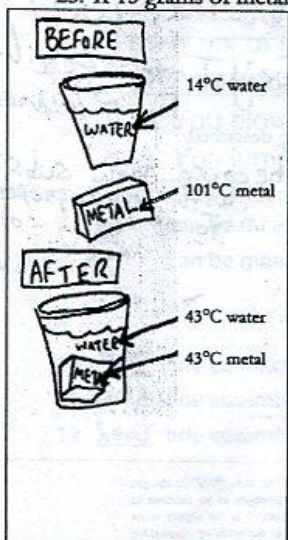
Lutetium — (Lutetia, ancient name for Paris, sometimes called cassiopeium by the Germans), Lu; at. wt. 174.967; at. no. 71; m.p. 1663°C; b.p. 3395°C; sp. gr. 9.840 (25°C); valence 3. In 1907, Urbain described a process by which Marignac's ytterbium (1879) could be separated into the two elements, ytterbium (neoytterbium) and lutetium. These elements were identical with "aldebaranium" and "cassiopeium," independently discovered by von Welsbach about the same time. Charles James of the University of New Hampshire also independently discovered lutetium.

Lithium — (Gr. *lithos*, stone), Li; at. wt. 6.941; at. no. 3; m.p. 180.54°C; b.p. 1342°C; sp. gr. 0.534 (20°C); valence 1. Discovered by Arfvedson in 1817. Lithium is the lightest of all metals, with a density only about half that of water. It does not occur free in nature; combined it is found in small amounts in nearly all igneous rocks and in the waters of many mineral springs. *Lepidolite*, *spodumene*, *petalite*, and *amblygonite* are the more important minerals containing it. Lithium is presently

20. If a mixture of these three metals is heated, circle which substance will melt first (based on their melting point (mp):
 magnesium Lutetium Lithium
21. If crushed and placed in foaming water which substance would sink fastest (based on their specific gravity):
 magnesium 1.7 Lutetium 9.8 Lithium 0.53
22. If a mixture of these three metals were heated until it was completely liquid and then allowed to cool, circle which substance would freeze (become solid) first (based on their melting point (mp):
 magnesium 648 Lutetium 1660 Lithium 180
23. If crushed and placed in foaming water which substance would float the best on the surface (based on their specific gravity):
 magnesium Lutetium Lithium
24. If heated until they were a gas, which substance would vaporize first? (based on the boiling point):
 magnesium 1090°C Lutetium 3395°C Lithium 1342°C

Show work for full credit.

25. If 15 grams of metal were dropped into 11 grams of water calculate the following.



a) Find ΔT for the water.

$$\Delta T = 43 - 14 = 29^\circ\text{C}$$

b) How many joules of heat entered the water?

$$Q = m c \Delta T$$
$$Q = (11\text{g}) \left(4.18 \frac{\text{J}}{\text{g}^\circ\text{C}} \right) (29^\circ\text{C})$$

$$Q = 1333.42 \text{ joules}$$

c) How many joules of heat left the metal? Must be the same as the joules that entered water!

d) Calculate the specific heat of the metal

Careful! Use all metal numbers, no water numbers now:

$$Q = m c \Delta T$$

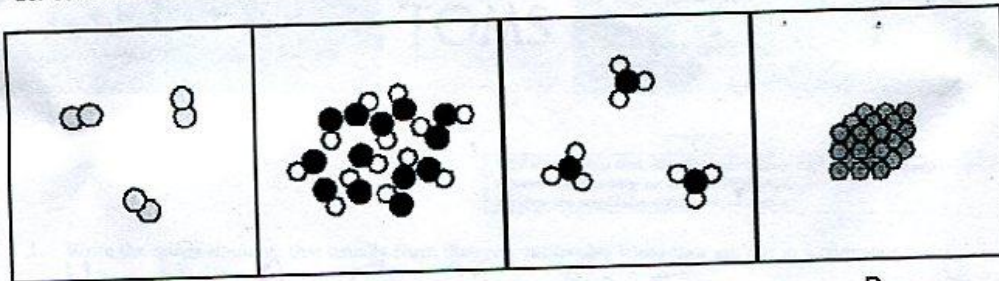
$$\frac{Q}{m \Delta T} = c$$

$$\frac{1333.42\text{J}}{(15\text{g})(58^\circ\text{C})} = c$$

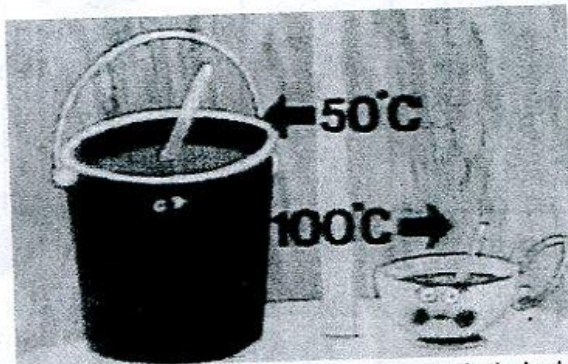
$$1.05 \frac{\text{J}}{\text{g}^\circ\text{C}} = c$$

↑
always show units in an answer ★★

26. Consider the four containers below.



- a. Which of these are mixtures? none! pure substances? A, B, C, D
- b. Which contain only compounds? B, C only elements A, D



27. Which has faster average vibration speed, water in the bucket on the left or water in the teacup on the right? The teacup (Because temperature is proportional to vibrational velocity.)

28. Which has more joules, water in the bucket on the left or water in the teacup on the right?

The bucket (Because $Q = m c \Delta T$)

↑
much
larger
mass
than
the
teacup