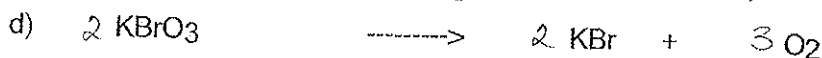
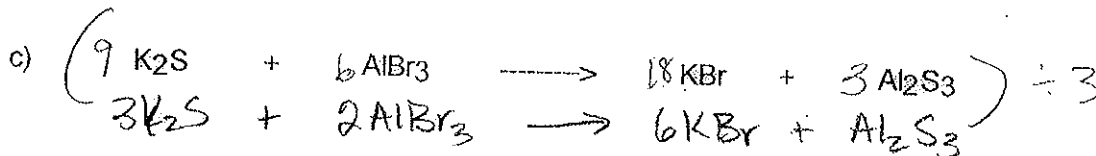
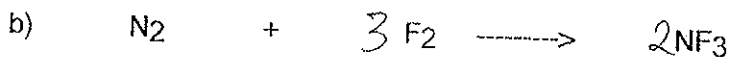
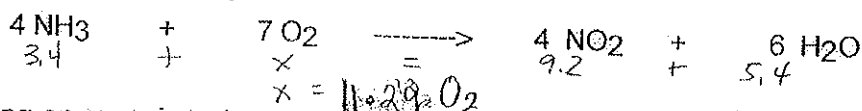


1. Balance the following equations.



2. Consider the following reaction.



During an experiment, a scientist combined 3.4 g. of NH_3 with an unknown mass of oxygen, O_2 , and produced 9.2 g of NO_2 and 5.4 g of H_2O . What mass of oxygen was used during this reaction?

3. A student dissolves 2.4 g of salt to make 750 mL of solution.

Find the concentration in grams per litre and parts per million.

$$m = 2.4\text{g} = 2400\text{mg}$$

$$V = 750\text{mL} = 0.75\text{L}$$

$$C = \frac{m}{V} = \frac{2400\text{mg}}{0.75\text{L}} = 3200\text{ppm}$$

$$C = \frac{m}{V} = \frac{2.4\text{g}}{0.75\text{L}} = 3.2\text{g/L}$$

4. How many grams of salt must be dissolved to make 400 mL of a 64 g/L solution?

$$m =$$

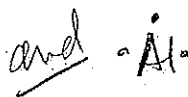
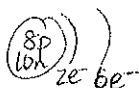
$$V = 400\text{mL} = 0.4\text{L}$$

$$C = 64\text{g/L}$$

$$m = C \times V = 64(0.4) = 25.6$$

$$m = 25.6\text{g}$$

5. Draw the Simplified Atomic Model and Lewis dot diagram for each of the following:



6. Write the period and family to which each of these elements belongs.

sodium 3 Alkali metal fluorine 2 Halogen
calcium 4 Alkaline Earth metal neon 2 Noble Gas

7. Beside each of the following formulas mark acid, base, salt or nonelectrolyte.

a) H_2SO_4 Acid b) KCl Salt
c) CH_3OH Non-Electrolyte d) CCl_4 Non-electrolyte
e) NaNO_3 Salt f) $\text{C}_6\text{H}_{12}\text{O}_6$ Non-electrolyte
g) HF Acid h) NH_4OH Base
i) $\text{Al}(\text{OH})_3$ Base j) $\text{Mg}(\text{OH})_2$ Base

8. Beside each of the following, mark acid if the statement refers only to acids, base if the statement refers only to bases, salts if the statement refers only to salts and all if the statement refers to all three types of solutions.

a) salt result when acids and bases are mixed
b) base feel slippery if spilled on skin
c) acid turn blue litmus paper red
d) acid neutralizes KOH
e) all conducts electricity when dissolved in water
f) acid react with metals to produce hydrogen gas
g) base found in soaps and shampoos
h) acid cause foods to have a sour taste
i) acid $\text{pH} = 4$
j) base $\text{pH} = 12$

9. Circle the substances that can neutralize a base?

a solution with $\text{pH} = 5$ a solution with $\text{pH} = 9$ MgBr_2 CaCO_3 $\text{Al}(\text{OH})_3$ HF

10. An base is added to an acidic solution. What happens to the pH?

pH increases, not

11. If the base completely neutralizes the acid, what pH will the solution have?

pH 7

12. State the major points in Dalton's model of the atom.

- matter made of small indivisible particles called atoms.
- atoms of the same element are identical
- atoms of different elements are different
- atoms react in definite ratios to form new compounds

13. For each of the following scientists, state the change to the atomic model that he proposed and state the experimental evidence that he used to justify the change.

	Change:	Evidence
Thomson	e^-	deflected particles of cathode ray tube
Rutherford	small dense positive nucleus	gold foil experiment, α particles pass through to screen
Bohr	orbitals	colour light from energised e^-
Chadwick	neutron	
	$A_t = [n]$	

14. Find the cost of using each of these appliances for one month (30 days) if electricity costs \$0.74/kWh

a) An iron is used 15 minutes each day. It draws 5 A on a 120 V line.

$$\begin{aligned}
 \text{Cost} &= E \cdot \text{rate} \\
 &= P \Delta t \cdot \text{rate} \\
 &= \frac{5(120)}{1000} \left(\frac{15 \times 30}{60} \right) (0.74) \\
 &= 0.6 (7.5)(0.74)
 \end{aligned}$$

$$\text{Cost} = \$3.33$$

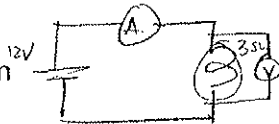
b) A 1200 W heater is used 4 hours each day.

$$\begin{aligned}
 \text{Cost} &= E \cdot \text{rate} \\
 &= P \Delta t \cdot \text{rate} \\
 &= \frac{1200}{1000} (4 \times 30) (0.74) \\
 &= 1.2 (120)(0.74)
 \end{aligned}$$

$$\text{Cost} = \$106.56$$

15. A circuit contains a 12 V power supply, ammeter, voltmeter, connecting wires and 3 Ω light bulb.

a) draw a circuit diagram



b) Find the power used.

$$P = IV$$

$$= 4(12)$$

$$P = 48W \approx 50W = P$$

$$I = \frac{V}{R} = \frac{12}{3} = 4A$$

$$V = IR$$

$$\frac{V}{R} = I$$

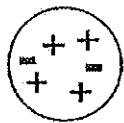
d) Find the energy used in 4 minutes.

$$E = Pat = IVAt = 4(12)(4 \times 60) = 11520$$

$$E = 10000J$$

16. Static electricity: a) How does a neutral object gain a positive charge?

-loses e^-



b) Is this ball positive or negative? How do you know?

+ b/c less "-" charges

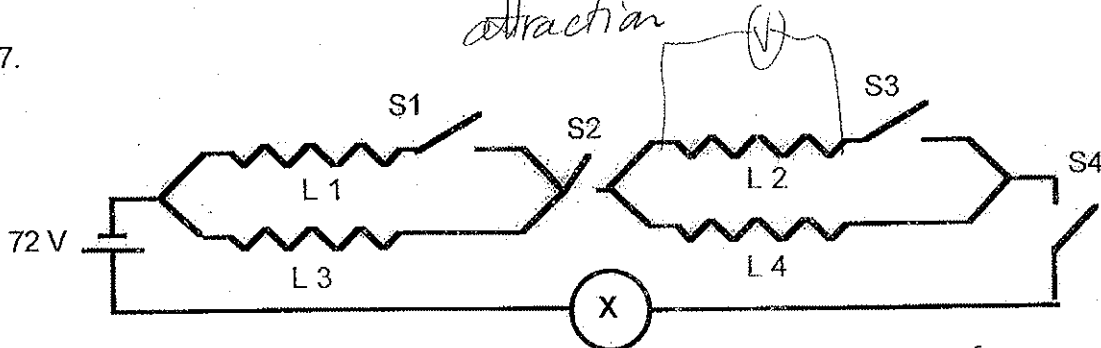
c) Will this ball attract a negative object or a positive object? Why?

negative b/c to become more neutral needs to gain "-" charges.

d) When two objects with a different charge touch, what happens?

attraction

17.



a) Which switches must be closed so that a current will flow? S2, S4

b) Is the instrument labeled X a voltmeter or an ammeter? How do you know?

ammeter b/c in series

c) When only switch S3 is open, which light will be brighter? Why?

L4, gets full potential difference

18. A power supply is connected to a 24 Ω resistor.

a) What is the voltage needed to produce a current of 1.5 A? $V = IR = 1.5(24) = 36V =$

b) What current flows if the power supply is set to 18 V? $I = \frac{V}{R} = \frac{18}{24} = 0.75A = I$

c) What is the power used when the voltage is 6 V?

$$P = IV ; I = \frac{V}{R}$$

$$= \left(\frac{V}{R}\right)V$$

$$= \frac{V^2}{R} = \frac{6^2}{24} = 1.5W$$

$$P = 2W$$

Science 416 Module III Review Sheet

For each of the following problems, identify each of the quantities given, write the required formula and solve the question. Check the units.

1. What mass is required to make 250 mL of a solution if the concentration is to be 32 grams/litre?

$$m = C \times V$$

$$m = 32 \text{ g/L} \times 0.25 \text{ L}$$

$$m = 8 \text{ g}$$

2. A student is told to dilute 200 mL of acid from a concentration of 48 g/L to a concentration of 12 g/L.

- a) What total volume 12 g/L solution will he be able to make?

$$C_1 = 48 \text{ g/L}$$

$$V_1 = 200 \text{ mL}$$

$$C_2 = 12 \text{ g/L}$$

$$V_2 = ?$$

$$V_2 = \frac{C_1 V_1}{C_2}$$

$$V_2 = \frac{48 \text{ g/L} \times 200 \text{ mL}}{12 \text{ g/L}}$$

$$V_2 = 800 \text{ mL}$$

- b) How much water will the student have to add?

$$800 \text{ mL} - 200 \text{ mL} = 600 \text{ mL}$$

3. A teacher needs 150 mL of a 3 g/L solution. She has only 15 g/L solution available. What volume of the 15 g/L solution does she need to use?

$$C_1 = 15 \text{ g/L}$$

$$V_1 = ?$$

$$C_2 = 3 \text{ g/L}$$

$$V_2 = 150 \text{ mL}$$

$$V_1 = \frac{C_2 V_2}{C_1}$$

$$V_1 = \frac{3 \text{ g/L} \times 150 \text{ mL}}{15 \text{ g/L}}$$

$$V_1 = 30 \text{ mL}$$

4. Arrange the following from least to most concentrated.

Solution A 0.125 g/mL

Solution B 40 g/120 mL

Solution C 12% m/V

Solution D 150 g/L

in g/mL

0.125 g/mL

0.33 g/mL

0.12 g/mL

0.15 g/mL

in g/L

125 g/L

333 g/L

120 g/L

150 g/L

C, A, D, B

5. Identify each of the following as an acid, base, acidic salt, neutral salt or basic salt.

Formula

Test

a) Na_2CO_3 turns red litmus blue

basic salt

b) H_2S turns blue litmus red

acid

c) KOH turns red litmus blue

base

d) MgCl_2 turns blue litmus red

acidic salt

e) NaF has no effect on litmus

neutral salt

6. State whether each of the following equations is correctly balanced by calculating the number of each type of atom on each side.

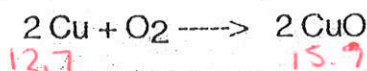


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7. Balance each of the following equations.



8. A student reacts 12.7 g of copper in oxygen and produces 15.9 g of copper oxide.

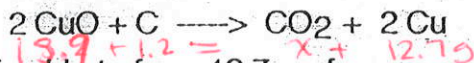


a) What mass of oxygen must have reacted?

$$12.7 + x = 15.9$$

$$x = 3.2 \text{ g}$$

b) The student takes all of the copper oxide that was formed and mixes it with 1.2 g of carbon and heats the mixture. The following reaction takes place.



The student is able to form 12.7 g of copper again. How many grams of carbon dioxide were formed?

$$15.9 + 1.2 = x + 12.7$$

$$x = 4.4 \text{ g}$$

9. Consider the following color charts for two acid base indicators.

pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Indicator A	red			orange			yellow							
Indicator B	yellow						green			blue				

A student mixes these indicators together and then tests a strong acid, a strong base and distilled water. What color will the mixture of indicators turn in each liquid. Justify your answer.

- a) Strong acid orange because red + yellow = orange (pH 1-3)
- b) Strong base green because yellow + blue (pH 12-14)
- c) Distilled water yellow because yellow = yellow at pH 7