


## Phys Sc 416/30

**Pretest 4.3** Test will be based on all of the underlined review topics listed below and other flashback topics.

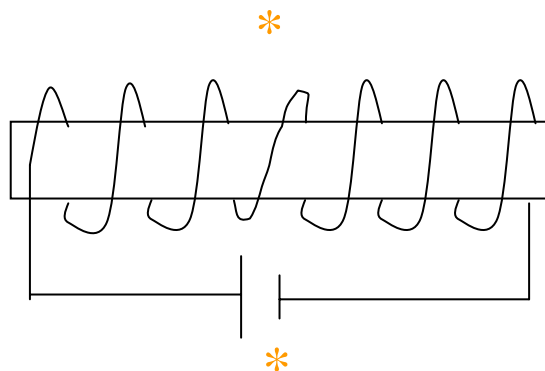
### Environment

1. Match the chemical or technology with the associated environmental problem.

- |    |   |  |                             |
|----|---|--|-----------------------------|
| a. | CO <sub>2</sub>   | _____ 2 _____  | 1. Acid rain                |
| b. | SO <sub>2</sub>   | _____ 1 _____  | 2. Global warming           |
| c. | CFC's   | _____ 3 mostly but also 2 _____  | 3. Ozone depletion          |
| d. | CH <sub>4</sub>   | _____ 2 _____  | 4. Soil and water pollution |
| e. | NO <sub>2</sub>   | _____ 1 _____  |                             |
| f. | Hg  | _____ 4 _____  |                             |
| g. |  | _____ 1 _____ and _____ 2 _____ and _____ 3 _____ and no room for you in environmental heaven! |                             |

### Magnetism

2. Indicate 2 places in the diagram where you would be able to place a compass and see it point to the **right**.



### Conductors and Insulators

3. **True? Or False?**

- Plastic is an insulator, meaning that it is a poor conductor of heat and electricity. T
- Copper and silver are better conductors than aluminum and tungsten. T
- To avoid extra resistance, it is better to use a longer wire than necessary. F
- To improve conductance, one should use as thin a wire as possible. F
- Placing electrical wires next to a heat source is a good idea since it will improve conductance. F

### The Joule Effect

4. How much power is lost if a high tension wire uses 50 000 V to transmit 100 000 W of power? R for the high tension wire = 1000  $\Omega$

$$\begin{aligned}P &= VI \\100\,000\text{ W} &= 50\,000\text{ I} \\I &= 2\text{A}\end{aligned}$$

$$\begin{aligned}\text{Power lost} &= I^2R \\&= 2^2(1000) \\&= 4000\text{ W}\end{aligned}$$

### Models of the Atom

5. TRUE? Or FALSE?
- a. According to Democritus, the atom is a small, dense, indivisible sphere. **F**
  - b. According to Thomson, the atom is a sphere in which the positive charges are concentrated in a nucleus and the negative charges surround the nucleus. **F**
  - c. According to Rutherford, the atom is a positive sphere in which the negative charges are evenly distributed throughout. **F**
  - d. According to Bohr, the atom is a sphere in which the positive charges are concentrated in a nucleus and the negative charges travel around the nucleus in orbits(energy levels is better). **T**
6. Following his experiments dealing with the deflections of alpha particles passing through a thin sheet of gold foil, Rutherford modified the atomic model Thomson had proposed.

Which two of the following statements derive directly from Rutherford's experiments?

- 1- The number of protons is equal to the number of electrons.
- 2- The electrons are contained in a positive sphere made up of protons.
- 3- Protons are concentrated in a very small positive area in the center of the atom.
- 4- Electrons move about in specific orbits.
- 5- An atom contains a very large amount of empty space.

**Answer:**     \_\_3\_\_ and \_\_5\_\_

### Preparing Solutions (Includes Dilution)

7. How many grams of KOH are needed to make 200 mL of a 3g /L solution. Outline the steps in used in the laboratory.

$$0.200\text{L} (3 \text{ g/L}) = 0.6 \text{ g}$$

**Weigh 0.6 g of KOH**

**Dissolve in a beaker with < 200 ml of wate**

**Transfer to a volumetric flask**

**Add water to 200 ml mark and mix.**

8. Given 20 L of a 4 mole/L of NaOH solution, how would you prepare 1.0 L of a 1.6 g/L solution? (belongs to 430 part of course)

$$C_1V_1 = C_2V_2$$

$$(4 \text{ mole/L}) V_1 = 1.6\text{g/L}(\text{mole}/40\text{g})(1)$$

**\*\*\*\*\*tricky because they mixed moles/L with g/L, so we have to convert**

$$V_1 = 0.010\text{L}$$

**Pipette 0.010 L from original.**

**Transfer to a 1.6 L flask.**

**Add water to line and mix.**

9. How would you prepare three solutions representing the three types of electrolytes?

**Add acid to water.**

**Add base to water**

**Add salt to water**

### Circuits

10. How do you connect three 12  $\Omega$  resistors so that your total resistance is 4  $\Omega$ ?

**Connect them in parallel.**

### **Phys Sc 430**

#### **Pretest 4.3 (430 part)**

### Periodic Trends

1. TRUE? Or FALSE?

a. In Period 2, electronegativity increases as the atomic number increases. **T**

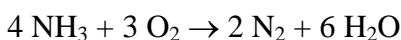
b. In Period 2, ionization energy decreases as the atomic number increases. **F**

c. In Period 2, atomic radius does not change as the atomic number increases. **F**

d. In group 1 (alkali metals), boiling points decrease and then increase as the atomic number increases. F

### Stoichiometry

1. Nitrogen gas and water vapour are produced when ammonia gas,  $\text{NH}_3$ , reacts with oxygen gas according to the following balanced chemical equation:



Calculate the mass of oxygen gas needed to produce 0.378 g of nitrogen gas.

$$0.378 \text{ g N}_2 (\text{mole}/28.0\text{g}) = 0.0135 \text{ moles N}_2$$

$$0.0135 \text{ moles N}_2 (3 \text{ O}_2 / 2 \text{ N}_2) = 0.02025 \text{ moles of O}_2$$

$$0.02025 \text{ moles of O}_2 (32.0 \text{ g/mole}) = 0.648 \text{ g (notice 3 significant figures)}$$

2. Define the term 'molecular molar mass'.

**Molecular molar mass is just molar mass, which is the mass of one mole of molecules,  
or the *mass* of the number of atoms found in 12.000 grams of  $^{12}\text{C}$ .**

3. How many atoms of oxygen are in a mole of ozone,  $\text{O}_3$ ?

$$3 \times 6.02 \times 10^{23} = 1.81 \times 10^{24} \text{ atoms}$$