

Directions as usual: first 40 minutes without notes; with your partner and non-programmable calculator. Next 10 minutes with notes. Next 25 minutes at the board.

1) Explain why Cd and B are used in a nuclear reactor.

2) Draw out and briefly explain how tritium is generated with lithium.

3) Name the following elements (spelling counts!)

K \_\_\_\_\_ As \_\_\_\_\_ Cf \_\_\_\_\_

Na \_\_\_\_\_ Sb \_\_\_\_\_ Bk \_\_\_\_\_

W \_\_\_\_\_ Sn \_\_\_\_\_ Es \_\_\_\_\_

Hg \_\_\_\_\_ Au \_\_\_\_\_ Fm \_\_\_\_\_

Cs \_\_\_\_\_ Pb \_\_\_\_\_ Ag \_\_\_\_\_

4) Write the elemental symbol[s] for the following:

Magnesium \_\_\_\_\_ Radium \_\_\_\_\_ Tantalum \_\_\_\_\_

Scandium \_\_\_\_\_ Astatine \_\_\_\_\_ Technetium \_\_\_\_\_

Zinc \_\_\_\_\_ Gallium \_\_\_\_\_ Molybdenum \_\_\_\_\_

Carbon \_\_\_\_\_ Protactinium \_\_\_\_\_ Neodymium \_\_\_\_\_

Radon \_\_\_\_\_ Plutonium \_\_\_\_\_ Fermium \_\_\_\_\_

5) Write out the chemical formula for the following:

Sulfuric acid \_\_\_\_\_ Sodium hydroxide \_\_\_\_\_ Lithium hydroxide \_\_\_\_\_

Hydrochloric acid \_\_\_\_\_ Acetic acid \_\_\_\_\_ Magnesium carbonate \_\_\_\_\_

Nitric acid \_\_\_\_\_ Lithium carbonate \_\_\_\_\_ Phosphoric acid \_\_\_\_\_

Potassium hydroxide \_\_\_\_\_

6) What makes an exothermic reaction exothermic?

7) What makes an endothermic reaction endothermic?

8) In your own words, define the Law of Conservation of Mass.

9) Succinctly define the Law of Electrical Charges:

10) Succinctly define the Law of Electrostatics:

11) Succinctly define the Law of Electrical Charge Distribution:

12) Succinctly define the Law of Electrical Charge Concentration:

13) Draw a simple electrical circuit with four resistors in series.

14) Draw a simple electrical circuit with four resistors in parallel.

15) If  $R_1 = 10 \text{ RU}$ ;  $R_2 = 20 \text{ RU}$ ;  $R_3 = 15 \text{ RU}$  and  $R_4 = 5 \text{ RU}$ , calculate the total resistance for question 13.

16) If  $R_1 = 10 \text{ RU}$ ;  $R_2 = 20 \text{ RU}$ ;  $R_3 = 15 \text{ RU}$  and  $R_4 = 5 \text{ RU}$ , calculate the total resistance for question 14.

17) Illustrate and define piezoelectricity.

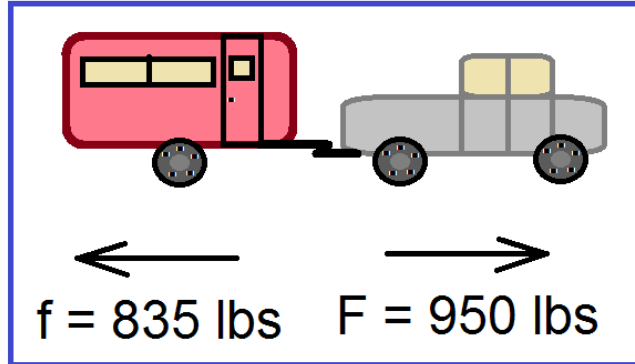
18) Illustrate how you would confine a plasma – remember to label the diagram.

19) Define what an anion is and how an element gets to be an anion.

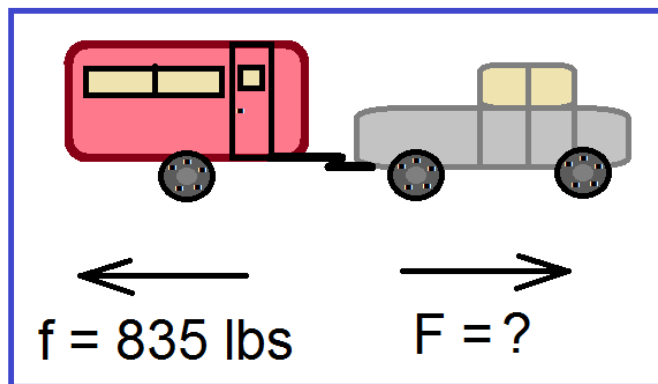
21) Define what a cation is and how an element gets to be a cation.

- 22) Given a crystal of lithium chloride and your knowledge of ionic radius calculations, if the edge length is 514 pm, what are the ionic radii lengths for the chloride ion and the lithium ion? Assume anion-to-anion diagonal contact. Hint: start with a drawing!
- 23) Given a crystal of potassium iodide and your knowledge of ionic radius calculations, if the edge length is 716 pm, what are the ionic radii lengths for the iodide ion and the potassium ion? Assume anion-to-anion diagonal contact. Hint: start with a drawing!

24) Given the following image, what is the  $F_{\text{net}}$  of the pickup and camper?



25) Given the following image, if the  $F_{\text{net}}$  is 115 lbs, what is the force  $F$ ?



26) Given the following image, which direction is the pickup and camper going (forward, backwards, stationary). Why?

