Topics in Chemistry

Answer the questions below to familiarize yourself with topics in chemistry that were not covered this year in class. You may use your textbook or the internet to find the information you need to answer the questions. Search engines such as Google, or chemistry sites such as Evan's Regents Chemistry Corner are good sources of information.

Kinetics and Equilibrium

Answer the questions below using *Table W*.

1. Determine the entropy of formation for ethene. .... _____

2. Determine the entropy of formation for water vapor. .... _____

For each of the following reactions at equilibrium, would an increase in pressure cause the reaction to (1) Shift left, (2) Shift right, or (3) Remain the same?

3. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ .... _____

4. $4H_2(g) + CS_2(g) \rightleftharpoons CH_4(g) + 2H_2S(g)$ .... _____

5. $CO(g) + H_2O(g) \rightleftharpoons H_2(g) + CO_2(g)$ .... _____

6. $H_2(g) + F_2(g) \rightleftharpoons 2HF(g)$ .... _____

7. $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ .... _____

For each of the following reactions at equilibrium, would an increase in temperature cause the reaction to (1) Shift left, (2) Shift right, or (3) Remain the same?

8. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ $\Delta H = -92$ kJ .... _____

9. $C(s) + H_2O(g) + heat \rightleftharpoons CO(g) + H_2(g)$ .... _____

10. $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g) + heat$ .... _____

11. $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g) + heat$ .... _____

12. $H_2O(\ell) \rightleftharpoons H^+(aq) + OH^-(aq)$ $\Delta H = 55.8$ kJ .... _____

For the reaction, $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ [$\Delta H = 52.7$ kJ], will each of the changes described below cause the reaction to (1) Shift left, (2) Shift right, or (3) Remain the same?

13. Addition of $H_2(g)$ .... _____

14. Removal of $I_2(g)$ .... _____

15. Increase in temperature .... _____

16. Increase in pressure .... _____

17. Addition of $HI(g)$ .... _____

Acids, Bases, and Salts

18. How much 6.0 M HNO_3 is needed to neutralize 39 mL of 2.0 M KOH? .... _____

19. How much 3.0 M NaOH is needed to neutralize 30. mL of 0.75 M H_2SO_4? .... _____

20. What is the concentration of 20 mL of LiOH if it is neutralized by 60 mL of 4 M HCl? .... _____

Redox and Electrochemistry
Write the half reactions for each of the redox reactions below:

21. $Zn + HNO_3 \rightarrow Zn(NO_3)_2 + NO_2 + H_2O$

22. $CdS + I_2 + HCl \rightarrow CdCl_2 + HI + S$

23. $NaClO + H_2S \rightarrow NaCl + H_2SO_4$

Organic Chemistry
Name the compound below and draw its condensed structural formula
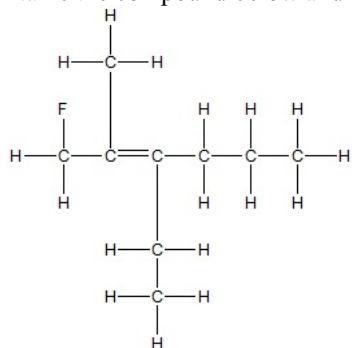
24. Name: _____

25. Condensed Structural Formula (Graphic Formula):

_____

26. Draw and name the isomers of C_6H_{14}.

Nuclear Chemistry
Write a complete nuclear equation showing the transmutation that occurs. Use *Table N* for reference.

27. What forms when carbon–14 decays?

28. What forms when radium–226 decays?

29. What forms when iron–53 decays?

Isomers

Answer the questions below using data from *Table N*, the table of *Selected Radioisotopes*

30. How long will it take for 30 g of ^{222}Rn to decay to 7.5 g?

31. How many grams of ^{16}N will be left from a 16 g sample after 21.6 s?

32. How long will it take for a 28 g sample of ^{226}Ra to decay to 3.5 g?

Nuclear Reactors

33. Draw and label the parts of a nuclear reactor. Explain the function of the parts.