Chem.G11- Course Practical Work-H.W

Problems

Qs.1-3:

Listed below are some imaginary data for a series of compounds. Based on what you have learned, predict whether each compound is probably ionic (I) or covalent (C). If the information given might apply to either kind of compound, put a question mark (E).

A. Ionic
B. Covalent
C. Either

1. Is composed of a metal and a nonmetal.
2. Is a hard, rough crystal.
3. Has a melting point of 1650ºC.

Qs.4-8:

The amount by which the freezing point of a solution is depressed or the boiling point is elevated is different for various solvents. The approximate values of these two quantities for the solvent water are given below. Calculate the freezing point and the boiling point of each of the solutions listed.

- ***Freezing point depression = -1.86ºC for 1 mole of solute particles per liter solution***
- ***Boiling point elevation = +0.52ºC for 1 mole of solute particles per liter solution***

Choose answers from the following list A to E

A. -1.86ºC; 100.52ºC
B. -3.35ºC; 100.94ºC
C. -1.34ºC; 100.37ºC
D. -9.30ºC; 102.60ºC
E. -1.86ºC; 100.52ºC

4. Solution H: 0.45*M* Na_3PO_4 F.P. = _____ B.P. = _____
5. Solution A: 1*M* sucrose F.P. = _____ B.P. = _____
6. Solution G: 0.36*M* KNO_3 F.P. = _____ B.P. = _____
7. Solution D: 0.5*M* NH_4Cl F.P. = _____ B.P. = _____
8. Solution C: 5*M* C_2H_5OH F.P. = _____ B.P. = _____

Qs.9-10:
Look at each of the electron dot structures shown below. In each case, decide: how many valence electrons are present; whether or not the particle is reactive; and if it is reactive, what it could do to become part of a stable compound and what kind of bond it would form in the process.

Choose answers from the following list A to E

A. 8, not reactive
B. 8, reactive
C. 6, not reactive
D. 8, reactive

9 

10 

Qs.11-13:
Write the formula and the name for the compound formed when the following atoms or groups of atoms combine with each other.

11. iron (3+) and sulfate

A. $Fe_2(SO_2)_3$; iron(III) sulfate
B. $Fe_2(SO_4)_3$; iron(III) sulfate
C. $Fe(SO_4)_3$; iron(III) sulfate
D. $Fe_2(SO_4)_2$; iron(III) sulfate

12. sulfur (6+) and oxygen

A. SO; sulfur trioxide
B. SO_2; sulfur trioxide
C. SO_3; sulfur trioxide
D. SO_4; sulfur trioxide

13. aluminum and fluorine

A. AlF_2; aluminum fluoride
B. AlF_3; aluminum fluoride
C. AlF_4; aluminum fluoride
D. AlF_5; aluminum fluoride

Qs.14-15:
Suppose that you were asked to select an element for each application listed in the following questions. All you have on which to base your decision is the element's position in the periodic table. Refer to the periodic table in your textbook. Name the element or type of element you would choose for each application and explain your choice.

14. An element that can be used in a study of radioactive metals.
Choice: _____
Reason: _____

A. an lanthanides; The lanthanides are all radioactive.
B. an lanthanides; not all the lanthanides are radioactive.
C. an actinide; not all the actinides are radioactive.
D. an actinide; The actinides are all radioactive.

15. An element that can be used as a fuel.
Choice: _____
Reason: _____

A. carbon; Carbon burns easily.
B. sodium; sodium burns easily.
C. calcium; calcium burns easily.
D. phosphorous ; phosphorous burns easily.

Qs.16-17:
The table shows the data collected in a series of five titration experiments between samples of nitric acid and sodium hydroxide. From the information in the table, determine the missing values.

Experiment	**Acid**		**Base**	
	molarity	**volume**	**molarity**	**volume**
101	0.10*M*	40.0 mL	0.20*M*	**a. _____**
102	**b. _____**	50.0 mL	0.14*M*	70.0 mL
103	0.40*M*	30.0 mL	**c. _____**	25.0 mL
104	0.010*M*	**d. _____**	0.0077*M*	65.0 mL
105	2.0*M*	16.0 mL	**e. _____**	25.0 mL

16. a. _____

A. 10.0 mL
B. 15.0 mL
C. 20.0 mL
D. 25.0 mL

17. c. _____

A. 0.38*M*
B. 0.48*M*
C. 0.58*M*
D. 0.68*M*

Qs.18-20:
The graph in Figure 10-1 shows what happens when 1 kg sample of each of two different substances are heated. Use the information in the graph to answer the questions. Assume that room temperature in this case is 300 K.

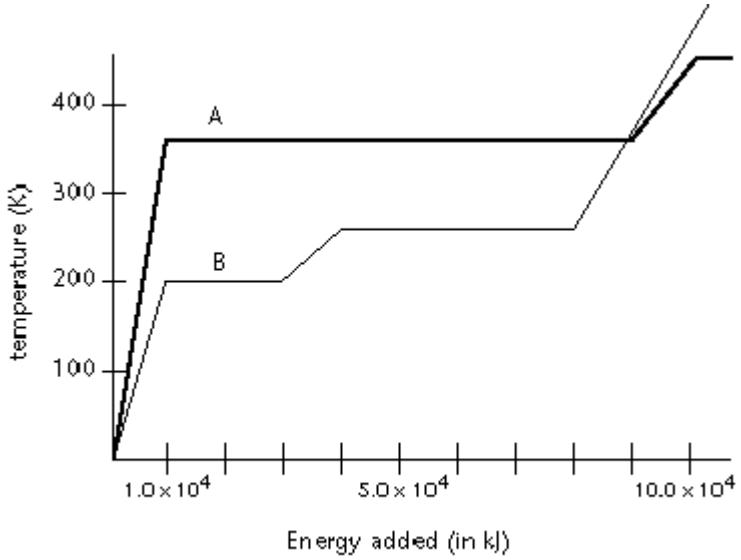

Figure 10-1

18. What is the melting point of substance B?

A. It is approximately 200 K.
B. It is approximately 250 K.
C. It is approximately 300 K.
D. It is approximately 350 K.

19. If you mixed substance A, substance B, and water, and steadily increased the temperature, which would boil last?

A. Substance A would boil last.
B. Substance A would boil last.
C. Substance A would boil last.
D. Substance A would boil last.

20. What is the physical state of substance A at room temperature?

A. It is a solid.
B. It is a liquid.
C. It is a gas.

Qs.21-25:
The following questions are some major biochemical families of compounds. Match the letter for the correct formula from Figure 19-1 that belongs to each of these families.

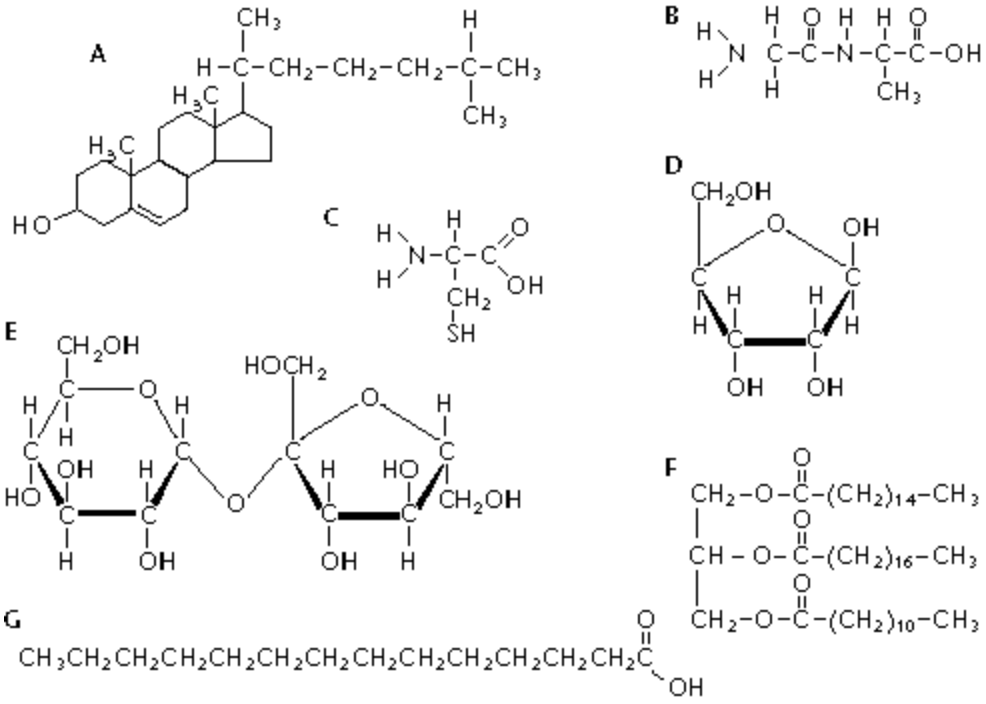

Figure 19-1

21. Dipeptide _____
22. Disaccharide _____
23. Steroid _____
24. Fatty acid _____
25. Amino acid _____

Qs.26-32:
This table summarizes some properties of eight compounds. Complete the table by supplying the correct information in the spaces provided.

Compound	Degree of ionization	Acid or base	Strong or weak	Ionization equation
$HC_2O_3O_2$	2%	acid	weak	$HC_2H_3O_2 + H_2O \rightarrow H_3O^+ + C_2H_3O_2^-$
RbOH	100%	**a.**	**b.**	**c.**
HCN	**d.**	acid	**e.**	**f.**
H_2O	10^{-5}%	both	**g.**	**h.**
H_3PO_4	**i.**	**j.**	**k.**	**l.**
m.	0.01%	**n.**	**o.**	$CH_3NH_2 + H_2O \rightarrow CH_3NH_3^+ + OH^-$
KNO_3	**p.**	**q.**	**r.**	**s.**
HFO_4	**t.**	**u.**	strong	**v.**

A. $H_2O + H_2O \rightarrow H_3O^+ + OH^-$
B. N/A
C. base
D. $HFO_4 + H_2O \rightarrow H_3O^+ + FO_4^-$
E. $RbOH \rightarrow Rb^+ + OH^-$
F. base
G. CH_3NH_2

26. r. _____
27. v. _____
28. c. _____
29. h. _____
30. a. _____
31. m. _____
32. n. _____

Qs.33-37:
A chemist is studying several unknown compounds. For each one, she has narrowed down the final identification to one of the two choices shown. Use the additional data shown in parentheses to make the correct choice for each.

33. butane or 1-butene (Reacts readily with chlorine gas.)

    A. butane
    B. 1-butene

34. propane or propyl alcohol (Is insoluble in water.)

    A. propane or
    B. propyl alcohol

35. methane or octane (Has structural isomers.)

    A. methane or
    B. octane

36. 1-decene or 1-decyne (Adds four molecules of HCl for each molecule.)

    A. 1-decene or
    B. 1-decyne

37. hexadecane or hexadecene (Forms a polymer.)

    A. hexadecane or
    B. hexadecene

Qs.38-40:
Sulfur dioxide gas (SO_2) reacts with oxygen to form sulfur trioxide gas (SO_3). The graph in Figure 6-1 shows how the concentration of these three gases changes over time in an experiment in which first the concentration of only the sulfur dioxide is increased, and then the concentration of only the oxygen is increased. Answer the following questions relating to this graph.

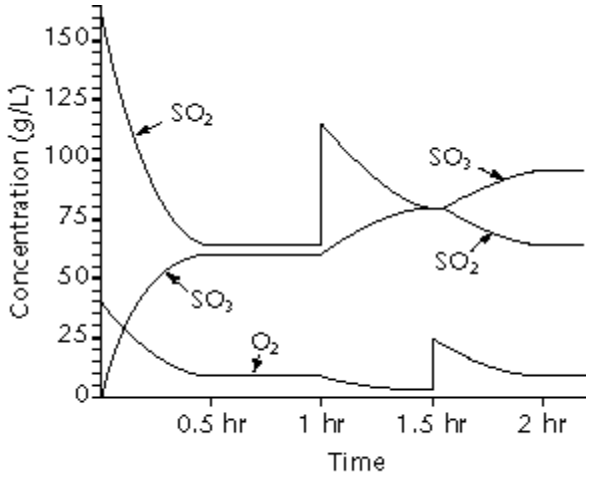

Figure 6-1

38. At about what time did this reaction reach equilibrium?

    A. 30 minutes
    B. 40 minutes
    C. 50 minutes
    D. 60 minutes

39. What are the approximate original concentrations of sulfur dioxide, sulfur trioxide, and oxygen?

    A. 140 g/L; 0 g/L; 20 g/L
    B. 150 g/L; 0 g/L; 30 g/L
    C. 160 g/L; 0 g/L; 40 g/L
    D. 170 g/L; 0 g/L; 50 g/L

40. At approximately what time was the concentration of oxygen increased?

    A. about 1 hour
    B. about 1 hour 30 minutes
    C. about 1 hour 45 minutes
    D. about 2 hours

Qs.41-45:
A group of students made a number of solutions of known concentration for the class stockroom. Unfortunately, they neglected to record all the information regarding the way in which the solutions were made. From the information provided in the chart below, determine the ten missing values indicated by the question marks.

Solute formula	**Solute mass**	**Solution volume**	**Molarity**
KOH	7.8 g	500 mL	?
LiCl	?	4.00 L	0.125*M*
$CaCl_2$	9.0 g	250 mL	?
$Al_2(SO_4)_3$	12.3 g	?	0.900*M*
K_3PO_4	?	250 mL	0.324*M*
$KClO_3$	122.5 g	?	1.0*M*
NH_4Br	?	2.0 L	0.50*M*
HNO_3	20.0 g	500 mL	?
HCl	?	750 mL	0.044*M*
$(NH_4)_2SO_4$	44.2 g	600 mL	?

41. _____ $KClO_3$ solution volume

    A. 1.0 L
    B. 1.2 L
    C. 1.4 L
    D. 1.6 L

42. _____ NH_4Br solute mass

A. 88.0 g
B. 90.0 g
C. 94.0 g
D. 98.0 g

43. _____ $CaCl_2$ molarity

A. 0.310*M*
B. 0.318*M*
C. 0.324*M*
D. 0.328*M*

44. _____ LiCl solute mass

A. 19.2 g
B. 20.2 g
C. 21.2 g
D. 22.2 g

45. _____ KOH molarity

A. 0.20*M*
B. 0.22*M*
C. 0.24*M*
D. 0.28*M*

Qs.46:
For each of the numbered elements (1-4) shown in the periodic table in Figure 3-1, give the information asked for in the tables.

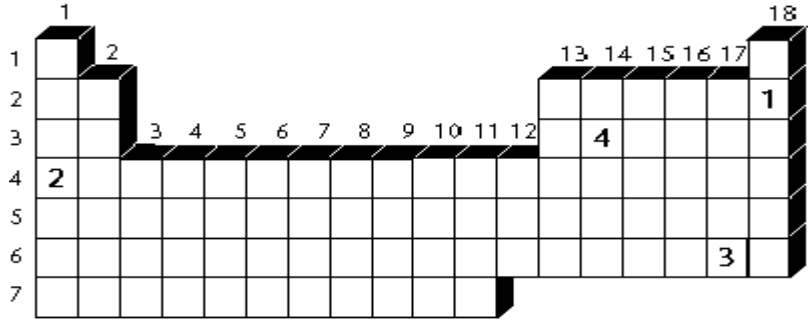

Figure 3-1

	Group	Period	Class	Number of valence electrons	Outermost energy level	Properties
Element 1:						

A. 15, 2, nonmetal, 5, 2, unreactive
B. 16, 2, nonmetal, 6, 2, reactive
C. 17, 2, nonmetal, 7, 2, reactive
D. 18, 2, nonmetal, 8, 2, unreactive

Qs.47-49:
Each of the following salts is dissolved in water. Predict whether the solution formed would be acidic, basic, or neutral.

A. acidic
B. basic
C. neutral

47. K_2SO_4
48. K_2CO_3
49. NaCN

Qs.50:
Technetium-99m is widely used in diagnosing medical problems. The graph in Figure 21-1 shows the rate at which a 200-gram sample of technetium-99m decays. Answer the following questions using the graph.

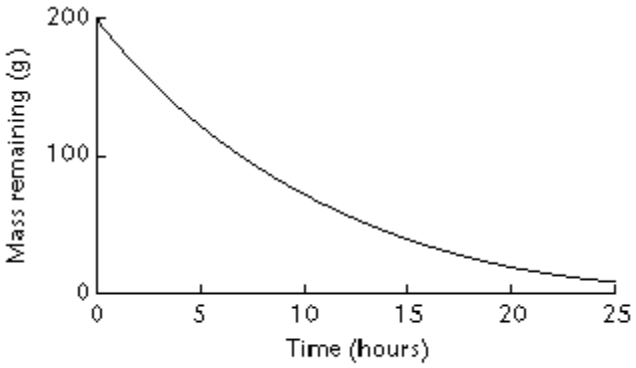

Figure 21-1

50. Estimate the amount of the original sample of technetium-99m that would remain after 1 h; after 10 h.

A. 180 g; 70 g
B. 170 g; 60 g
C. 160 g; 50 g
D. 150 g; 40 g

Qs.51:
Below are listed changes that can be observed in everyday life. Tell whether it is a physical change or a chemical change. Then explain the basis on which you made your decision.

51. iron rusting-

A. physical change
B. chemical change

Qs.52-53:
The compounds listed below are all somewhat different from the kinds of compounds you have studied. Explain how each compound is different and write the formula for the compound.

52. sodium aluminum sulfate
    a. Difference:
    b. Formula:

    A. It is uncommon for two different positive elements to combine at the same time with one negative polyatomic ion., $NaAl(SO_2)_2$
    B. It is uncommon for two different positive elements to combine at the same time with one negative polyatomic ion., $NaAl(SO_4)_2$
    C. It is uncommon for two different positive elements to combine at the same time with one negative polyatomic ion., $NaAl(SO)_2$
    D. It is uncommon for two different positive elements to combine at the same time with one negative polyatomic ion., $NaAlSO_4$

53. xenon hexafluoride
    a. Difference:
    b. Formula:

    A. Noble gases usually do not form compounds. .XeF_6
    B. Noble gases usually do not form compounds. .XeF_5
    C. Noble gases usually do not form compounds. .XeF_4
    D. Noble gases usually do not form compounds. .XeF_3

54. Draw the structure of the unsaturated hydrocarbon 3-heptene.

    A. $CH_3CH_2CH=CHCH_2$
    B. $CH_3CH_2CH=CHCH_2CH_2$
    C. $CH_3CH_2CH=CHCH_2CH_2CH_3$
    D. $CH_3CH_2CH=CHCH_2CH_2\ CH_2CH_3$

55. Convert each of the following temperature measurements to kelvins: 94ºC, -101ºC, 388ºC.

    A. 367 K, 172 K, 661 K
    B. 357 K, 172 K, 671 K
    C. 367 K, 172 K, 661 K
    D. 357 K, 172 K, 651 K

56. How much heat in kilojoules is released when 25.0 g of water is cooled from 85.0ºC to 40.0ºC?

    A. 4.41 kJ
    B. 4.51 kJ
    C. 4.61 kJ
    D. 4.71 kJ

57. Draw a halogenated compound, where *R* is $CH_2=CHCH_2^-$ and *X* is Cl.

A. $CH_2=CHCH_2Cl$
B. $Cl\text{-}CH_2=CHCH_2$
C. $CH\text{-}CH_2=CH_2Cl$
D. $CH_2= CH_2CHCl$

58. Natural gas is often stored in large tanks kept under constant pressure by a dome that rides up and down on vertical tracks. Suppose the volume of gas in a municipal tank measures 2.50×10^6 m^3 during the evening when the temperature is 15ºC. What will be the volume of the gas in the tank during the day when the temperature rises to 27ºC?

A. The volume of the gas will be 2.00×10^6 m^3.
B. The volume of the gas will be 2.20×10^6 m^3.
C. The volume of the gas will be 2.40×10^6 m^3.
D. The volume of the gas will be 2.60×10^6 m^3.

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