Chem15, Fall 2016, SJCC, Test1 Name KEY

Please read all the questions VERY carefully before answering. On scantron start from the same bubble number as the question number for your multtiple choice question. Write neatly. If I cannot read your answer, you will not receive any point. Use the attached periodic table and constant chart. No outside paper is allowed. Total points = 46 + (22x3=)66 = 112

SHORT ANSWER. In all calculations, write the set up equation first, then put the raw data with units. Then do your calculations. Points will be deducted if your answer is not clearly written.

1) Show calculations with units and sig. fig.to convert 16.32 gallon (gal) into milliliter (mL) (given 1 gal = 3.785 L and 1 L = 1000 mL). (6 pts.)

1) 6.177×10^4 mL

$$16.32 \text{ gal} \times \frac{3.785 \text{ L}}{1 \text{ gal}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 61771.2 \text{ mL}$$

$$= 6.177 \times 10^4 \text{ mL}$$

GAL → ML

$$\text{gal} \times \frac{3.785 \text{ L}}{1 \text{ gal}} \times \frac{1000 \text{ mL}}{1 \text{ L}}$$

2) Calculate (with units and sig fig) how many in^3 are in 2.20 cm^3 (1 in = 2.54 cm.)? (8 pts.)

2) 0.134 in^3

$$2.20 \text{ cm}^3 \times \frac{1 \text{ in}^3}{(2.54 \text{ cm})^3} = 0.134252237 \text{ in}^3$$

$$= 0.134 \text{ in}^3$$

$cm^3 \rightarrow in^3$

$$\text{cm}^3 \times \frac{1 \text{ in}^3}{(2.54 \text{ cm})^3}$$

3) Calculate the density of 96.0 mL of a liquid (with correct number of sig fig and units) that has a mass of 90.5 g? (6 pts.)

3) 0.943 g/mL

$V = 96.0$ mL

$m = 90.5$ g

$d = \frac{m}{V}$

$$d = \frac{90.5 \text{ g}}{96.0 \text{ mL}}$$

$$d = 0.942708333 \text{ g/mL}$$

$$= 0.943 \text{ g/mL}$$

4) Write the formula for (3 pts. each; Total 9 pts.): 4) _____

(a) Ammonium phosphate: $NH_4^+ \; PO_4^{3-} \rightarrow \boxed{(NH_4)_3PO_4}$

(b) Calcium Sulfate: $Ca^{2+} \; SO_4^{2-} \rightarrow \boxed{CaSO_4}$

(c) Phosphorus pentachloride: $\boxed{PCl_5}$

5) Suppose it took 108 joules of energy to raise a bar of gold from 25.0°C to 29.7°C. Given that the specific heat capacity of gold is 0.128 J/g·°C, what is the mass (in grams) of the bar of gold? Show all your calculations with set up equation and units and sig. fig.. Given q = m.C. ΔT. (8 pts.) 5) 1.80×10^2 g

$q = 108\ j$

$\Delta T = 29.7\ ^\circ C - 25.0\ ^\circ C$

$c = 0.128\ j/g \cdot ^\circ C$

$m = ?$

$q = mc\Delta T$

$108\ j = m(0.128\ j/g \cdot ^\circ C)(4.7\ ^\circ C)$

$m = \dfrac{108\ j}{(0.128\ j/g \cdot ^\circ C)(4.7\ ^\circ C)} = 179.52127669\ g$

$= 1.80 \times 10^2\ g$

6) Write the name for (3 pts. each; Total 9 pts.): 6) _____

(a) $Ca(HSO_4)_2$: calcium bisulfate / calcium hydrogen sulfate

(b) $Al_2(CrO_4)_3$: aluminum chromate

(c) $Co(ClO_4)_2$: cobalt (II) perchlorate

MULTIPLE CHOICE. On scantron start from the same bubble number as the multiple choice question number. Choose the one alternative that best completes the statement or answers the question (3 pts. each).

7) The correct number of significant figures in the number 0.002320 is: 7) B

A) 3
B) 4
C) 7
D) ambiguous
E) none of the above

8) Determine the answer to the following equation with correct number of significant figures: 8) A

$(4.123 \times 0.12) + 24.2 =$ _____ 0.494760 + 24.2 = 24.694760

24.7

A) 24.7
B) 24.695
C) 24.70
D) 25
E) none of the above

9) The correct prefix for the multiplier 1,000,000 is: 9) A

A) mega.
B) micro.
C) milli.
D) nano.
E) none of the above

10) Which state of matter has indefinite shape and is compressible? 10) D

A) plasma
B) liquid
C) solid
D) gas
E) none of the above

11) How would you classify salt water? 11) C

A) pure substance-element
B) mixture-heterogeneous
C) mixture-homogeneous
D) pure substance-compound
E) none of the above

12) If a particular process is endothermic, the reverse process must be a (an) 12) D

A) chemical change.
B) isothermal process.
C) endothermic process.
D) exothermic process.
E) none of the above

13) What is the value of 98 °F in units of °C? 13) A

A) 37
B) 371
C) 22
D) 72
E) none of the above

$98\,^{\circ}F = 32 + 1.8\,^{\circ}C$ $\quad ^{\circ}C = 37$

$\frac{98 - 32}{1.8} = {}^{\circ}C$

14) An atom containing 7 protons, 8 neutrons, and 7 electrons 14) C

A) is an ion.
B) cannot exist.
C) is charge-neutral.
D) is an oxygen atom.
E) none of the above

15) Which of the following elements has only 12 protons? 15) D

A) O
B) C
C) Zn
D) Mg
E) none of the above

16) The names of the elements whose symbols are Si, P, Mn, and S are respectively, 16) E

A) silicon, phosphorus, magnesium, and sulfur.
B) silicon, potassium, magnesium, and sulfur.
C) silicon, potassium, magnesium, and sodium.
D) silver, phosphorus, magnesium, and sulfur.
E) silicon, phosphorus, manganese, and sulfur.

17) Metals are located where on the periodic table? 17) C

A) zig-zag diagonal line
B) right side
C) left side
D) middle
E) none of the above

18) How many protons and electrons are present in O^{2-}? 18) A

A) 8 protons and 10 electrons
B) 10 protons and 8 electrons
C) 8 protons and 8 electrons
D) 16 protons and 8 electrons
E) none of the above

19) What is the charge on the ion formed by selenium? 19) A

A) 2-
B) 2+
C) 1-
D) 1+
E) none of the above

20) How many total atoms are in the formula $Al_2(CO_3)_3$? $Al_2\ CO_3 CO_3\ CO_3$ $2+3+9=14$ 20) D

A) 12
B) 9
C) 8
D) 14
E) none of the above

21) Which among the following elements does NOT exist as a diatomic molecule in nature? 21) A

A) neon
B) hydrogen
C) nitrogen
D) fluorine
E) none of the above

22) What is the formula for an ionic compound made of magnesium and sulfur? 22) B

A) MgS_2
B) MgS
C) Mg_2S_3
D) Mg_2S
E) none of the above

$Mg^{2+}\ S^{2-} \rightarrow MgS$

23) What is the name of the compound made from lithium and oxygen? 23) A

A) lithium oxide
B) oxygen lithide
C) lithium dioxide
D) lithium(I) oxide
E) none of the above

$Li^{+}\ O^{2-} \quad Li_2O$

TRUE/FALSE. In scantron fill the circle "A" for a True answer and "B" for False answer (3 pts. each).

24) The mass of an object, 4.55×10^{-3} g, expressed in decimal notation is 0.000455 g. → 0.00455 24) B

25) The charges on electrons and neutrons cancel each other to give neutral atoms. 25) B

26) A cation forms when an atom gains an electron. 26) B

27) All elements have three or more naturally occurring isotopes. 27) B

28) The proper name for SF_6 is sulfur tetrafluoride. sulfur hexafluoride 28) B