Foothill College, Chem25, Fall18, Test1 46-4=42/90/132/136 Name KEY

Please read all the questions VERY carefully before answering. Start from number 8 on your scantron for multiple choice questions. 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+ (30x3=)90=136

SHORT ANSWER. In all calculations, (1) write the set up equation first, then (2) put the raw data with units. Finally (3) do your calculations with correct number of significant figures. Points will be deducted if your answer is not clearly written.

1) Show calculations with units to convert 16.32 gallon (gal) into milliliter (mL) (given 1 gal = 3.785 L and 1 L = 1000 mL). (6 pts.) 1) 6.177×10^3 mL

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

$$61.77 \times 10^3\ \text{mL}$$

2) A room has dimensions of 10.0 ft × 20.0 ft × 8.00 ft. Given that there are three feet in a yard, calculate the volume of the room in yd^3? (8 pts.) (1 yd = 3 ft) 2) 59.3 yd^3

$$10.0 \times 20.0 \times 8.00 = 1600\ ft^3 \rightarrow yd^3$$

$$1600\ ft \times ft \times ft \times \frac{1\ yd}{3\ ft} \times \frac{1\ yd}{3\ ft} \times \frac{1\ yd}{3\ ft} = 59.259259\ldots$$

$$59.3\ yd^3$$

3) Calculate the density of 96 mL of a liquid that has a mass of 90.5 g? (6 pts.) 3) .943 g/mL

$$D = \frac{M}{V}$$

$D = x$

$M = 90.5\ g$

$V = 96\ mL$ *

* Ambiguous

$$x = \frac{90.5\ g}{96\ mL} = .9427\ldots$$

2 Sig Figs

Check

$.943 \cdot 90.5 = V\ (96)$

$M = VD = 96 \cdot .943 = 90.528$

4) Show your calculation to find how many kilojoules are there in 95.0 Calories with correct numbers of significant figures? (Note the capital C in Calorie and given 1 cal = 4.18 joules) (6 pts.)

4) 3.97×10^7 kj

Cal → cal → j → kj

$$95 \text{ Cal} \times \frac{1000 \text{ cal}}{1 \text{ Cal}} \times \frac{4.18 \text{ j}}{1 \text{ cal}} \times \frac{100 \text{ kj}}{1 \text{ j}} \times \frac{1 \text{ kj}}{1000 \text{ j}} = 39710000 \text{ kj}$$

3.97×10^7 kj

= 397 kj

-2

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. Given q = m.C. ΔT. (8 pts.)

5) 1.8×10^2 g

$$m = \frac{q}{C \cdot \Delta T} = \frac{108 \text{ j}}{.128 \text{ j/g°C}(29.7°C - 25.0°C)}$$

Heat, Mass, SH, Temp Change

$29.7°C - 25.0°C$

$$\frac{108 \text{ j}}{.128 \text{ j/g°C}(4.7)°C} \quad \frac{108}{.6016} = 179.5212766$$

1.8×10^2 g ✓

6) If a mixture of salt and sand contained 45.9% salt then calculate the amount of sand present 25.68 g of the mixture (6 pts.)

6) ~~11.8~~ 14.0 g

25.68 Mix of Sand & Salt

45.9% Salt

$$\frac{45.9\%}{x} \times \frac{100\%}{25.9 \text{ g}} = 11.8881\% \text{ g salt}$$

25.68

25.9 g − 11.8881 g

= 14.0119

= 13.89

-1

2

25.68 × 0.459 = 11.787 g Salt

∴ Sand = 25.68 − 11.787 = 13.89 g

7) Chlorine has two isotopes: Cl-35 wih natural abundance 75.77% and mass of 34.97 amu and another one Cl-37 with natural abundance 24.23% and mass 36.97 amu. Calculate the atomic mass of chlorine with correct unit (6 pt.). 7) 35.45 amu

Isotope	Abundance
Cl-35 34.97	75.77
Cl-37 36.97	24.23

(34.97 x .7577) + (36.97 x .2423)
= 35.4546 ✓

26.496769 + 8.957871

MULTIPLE CHOICE. Start from number 8 on your scantron. Choose the one alternative that best completes the statement or answers the question (3 pts. each).

8) The correct scientific notation for the number 0.00050210 is: 8) C
A) 5.0210×10^4
B) 5.021×10^{-4}
C) 5.0210×10^{-4}
D) 5.021×10^4
E) none of the above

9) The correct number of significant figures in the number 0.027090 is: 9) A
A) 5
B) 6
C) 7
D) ambiguous
E) none of the above

10) Determine the answer to the following equation with correct number of significant figures: 10) B
$(4.123 \times 0.12) + 24.2 =$ 24.7
A) 24.695
B) 24.7
C) 24.70
D) 25
E) none of the above

24.69...

11) The correct prefix for the multiplier 1,000,000 is: 11) A
A) mega.
B) micro.
C) milli.
D) nano.
E) none of the above

12) What is the standard SI unit for mass? 12) A

A) kilogram
B) ton
C) gram
D) pound
E) none of the above

13) How many cm^3 are there in 1.25 ft^3? 13) B

A) 38.1
B) 3.54×10^4
C) 5.49×10^3
D) 246
E) none of the above

14) The distance from New York City to Washington, DC is approximately 235 miles. Identify the correct solution map to convert from miles to kilometers using the prefix multipliers and the given conversion factors: 1 mile = 5280 ft; 1 ft = 12 in; 1 in = 2.54 cm. 14) C

A) $235 \text{ mile} \times \frac{1\ 2 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{1 \text{ m}}{10^{-2} \text{ cm}} \times \frac{10^3 \text{ km}}{1 \text{ m}}$

B) $235 \text{ mile} \times \frac{1 \text{ ft}}{5280 \text{ mile}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} \times \frac{10^{-2} \text{ cm}}{1 \text{ m}} \times \frac{1 \text{ km}}{10^3 \text{ m}}$

C) $235 \text{ mile} \times \frac{5280 \text{ ft}}{1 \text{ mile}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{10^{-2} \text{ m}}{1 \text{ cm}} \times \frac{1 \text{ km}}{10^3 \text{ m}}$

D) $235 \text{ mile} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} \times \frac{10^{-2} \text{ cm}}{1 \text{ m}} \times \frac{1 \text{ km}}{10^3 \text{ m}}$

E) $235 \text{ mile} \times \frac{5280 \text{ ft}}{1 \text{ mile}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{2.54 \text{ in}}{1 \text{ ft}} \times \frac{1 \text{ m}}{10^{-2} \text{ cm}} \times \frac{10^3 \text{ km}}{1 \text{ m}}$

15) What is the density (g/mL) of an object that has a mass of 14.01 grams and, when placed into a graduated cylinder, causes the water level to rise from 25.2 mL to 33.6 mL? 15) B

A) 1.8
B) 1.7
C) 2.4
D) 0.60
E) none of the above

16) Which state of matter has indefinite shape and is compressible? 16) D

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

17) How would you classify salt water? 17) C

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

18) Which of the following items is a chemical property? 18) B

A) the paint color on a new red Corvette
B) the tarnishing of a copper statue
C) the odor of spearmint gum
D) the melting and boiling point of water
E) none of the above

19) If a particular process is endothermic, the reverse process must be a (an) 19) D

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

20) What is the value of 98 °F in units of °C? 20) A

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

21) 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? 21) C

A) 6.5×10^1 g
B) 1.28×10^2 g
C) 1.8×10^2 g
D) 1.08×10^2 g
E) none of the above

22) The atomic mass unit is defined as: 22) A

A) 1/12 the mass of a carbon atom containing six protons and six neutrons.
B) the mass of electrons found in a carbon atom containing six protons and neutrons.
C) 1/14 the mass of a nitrogen atom containing 7 protons and 7 neutrons.
D) the mass of the hydrogen atom containing only one proton.
E) none of the above

23) Which of the following elements has only 12 protons? 23) D

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

24) The names of the elements whose symbols are Si, P, Mn, and S are respectively, 24) 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.

25) Cr is a member of which family? 25) E

A) alkali metals
B) noble gases
C) alkaline earth metals
D) halogens
E) none of the above

26) What is the correct formula for a potassium ion with 18 electrons? 26) A

A) K^+
B) P^-
C) P^+
D) K^-
E) none of the above

27) An atom that has the same number of neutrons as $^{138}_{56}Ba$ is: 27) D

A) $^{136}_{56}Ba$
B) $^{137}_{57}La$
C) $^{138}_{55}Cs$
D) $^{136}_{54}Xe$
E) none of the above

28) How many protons and electrons are present in O^{2-}? 28) 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

29) Isotopes are: 29) B

A) atoms of the same element that have different number of protons.
B) atoms of the same element that have different number of neutrons.
C) atoms of the same element that have different number of electrons.
D) atoms of the same element that have the same number of neutrons.
E) none of the above

30) A fictional element has two naturally occurring isotopes with the natural abundances shown here: 30) A

ISOTOPE	ABUNDANCE
18	40.0%
20	60.0%

Which statement is TRUE for this element?

A) The atomic mass would be closer to 20 than to 18.
B) The atomic mass would be greater than 20.
C) The atomic mass would be closer to 18 than to 20.
D) The atomic mass would be exactly 19.
E) The atomic mass would be less than 18.

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

31) The decimal number 0.0000010 expressed in scientific notation is 1.0×10^6. 31) B

32) Zeros located between two numbers are not significant. 32) B

33) When the temperature of an object is reported as 23.7°C, the actual temperature can be assumed to be between 23.6°C and 23.8°C. 33) A

34) One mile measures 5,280 feet long, so one square mile is equivalent to 5,280 square feet. 34) B

35) The atomic number of nitrogen is 14.01. 35) B

36) The charges on electrons and neutrons cancel each other to give neutral atoms. 36) B

37) A cation forms when an atom gains an electron. 37) B