Chem25, Spring 2013, Foothill College, Test1 Name KEY 05

Please read all the questions VERY carefully before answering. Use a pen to answer the short question and a pencil to fill out the circles in the scantron. 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 = 45+ (29x3=)87=132

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 to convert 6.32 cm into feet with correct numbers of significant figures (given 1 in = 2.54 cm. and 12 inch = 1 feet). (5 pts.) 1) .207 feet

$$6.32\,cm \times \frac{1\,inch}{2.54\,cm} \times \frac{1\,feet}{12\,inch} = .207\,feet$$

3 sig fig

2) Calculate (with units) how many in^3 are in 2.20 cm^3 (1 in = 2.54 cm.) with correct numbers of significant figures? (8 pts.) 2) .134 in^3

$$2.20\,cm^3 \times \frac{1\,in}{2.54\,cm} \times \frac{1\,in}{2.54\,cm} \times \frac{1\,in}{2.54\,cm} = .134\,in^3$$

3 sig fig

3) Calculate the volume of 12.8 g of a liquid that has a density of 0.789 g/mL. with correct numbers of significant figures(6 pts.) 3) 16.2 mL

$$d = \frac{m}{V} \longrightarrow 0.789\,g/mL = \frac{12.8\,g}{V}$$

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

3 sf

$$16.2\,mL = \frac{12.8\,g}{0.789\,g/mL}$$

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

$$\frac{12.8\,g}{16.2\,mL} = 0.789\,g/mL$$

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) 397 kj

$$95.0\ \text{Calories} \times \frac{1000\ \text{calories}}{1\ \text{Calorie}} \times \frac{4.18\ \text{j}}{1\ \text{cal}} \times \frac{1\ \text{kj}}{1000\ \text{j}}$$

3 sf

= 397.1

= 397

3sf

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) 180 g

29.7 − 25.0

$q = mc\Delta t$

$\frac{q}{c\Delta t} = m$

$$\frac{108\ \text{joules}}{(0.128\ \text{J/g}\cdot°\text{C})(4.7\ °\text{C})} = \boxed{179.52\ \text{g}}$$

3 sig figs:

25.0, 29.7, 108

Check

(179.52 g)(0.128 J/g°C)(4.7°C)

= 107.99

= 108 joules

$2 = \frac{2.0g}{1.0L}$ | $= \frac{2.0g}{2.0L}$ $d = \frac{m}{V}$

6) During density measurement of sulphur, if the sulphur piece was large and the top of the sulphur was above the water level, would your measured density of sulphur would be 6) _____

(a) HIGH or LOW or it would be CORRECT (circle the correct one) (2 pts)

(b) Explain/show your logic (2 pts.).

It would be higher because we are not getting the true volume of the sulphur piece. This incorrect measurement would cause us to divide the mass of the sulphur with a smaller, incorrect volume and yield a greater density from the calculations because we are dividing by a smaller number.

7) A fictional element has three isotopes with their natural abundances shown as: 7) 22.83amu

MASS (amu)	ABUNDANCE
22.1760	45.00%
23.1847	45.00%
24.1934	10.00%

4sf 4sf 4sf

Show your calculation to determine the atomic mass of the element. (8pts.)

$(22.1760 \times .4500) + (23.1847 \times .4500) + (24.1934 \times .1000)$

$9.9792 + 10.433115 + 2.41934$

addition:

$= 22.831655$

2 decimal places

$= 22.83$ amu

10.43

MULTIPLE CHOICE. Use scantron to answer the questions. Choose the one alternative that best completes the statement or answers the question (3 pts. each).

8) The correct scientific notation for the number 500.0 is: 8) ~~E~~ C

A) 5.00×10^2
B) 5×10^2
C) 5.000×10^2
D) 5×10^{-2}
E) none of the above

5.0×10^2

9) There are exactly 2.54 centimeters in 1 inch. When using this conversion factor, how many significant figures are you limited to? 9) E

ratio = infinite

A) 1
B) 3
C) ambiguous
D) depends on if you are using it in multiplication/division or addition/subtraction
E) infinite number of significant figures

10) The correct number of significant figures in the number "9.080 × 10^4" is 10) B

A) ambiguous
B) 4
C) 3
D) 5
E) none of the above

11) Determine the answer to the following equation with correct number of significant figures: 11) D

13.96 – 4.9102 + 71.5 = _____

A) 80.5498
B) 81
C) 80.55
D) 80.5
E) none of the above

1 decimal place

80.5

12) Determine the answer to the following equation with correct number of significant figures: 12) D

(4.123 × 0.12) + 24.2 = _____

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

2 sf

(4.123 × 0.12)

= .49476 + 24.2

= 24.7

1 decimal point

13) The correct prefix for the multiplier 1,000 is: 13) E

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

$10^3 = 1000$

14) What is the standard SI unit for length? 14) _____

A) foot
B) meter
C) mile
D) centimeter
E) none of the above

15) How many cm^3 are there in 1.25 ft^3? 15) B

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

$1.25\ ft^3 \times \frac{12\ in}{1\ ft} \times \frac{12\ in}{ft} \times \frac{12\ in}{ft} \times \frac{2.54\ cm}{1\ in} \times \frac{2.54\ cm}{1\ in} \times \frac{2.54\ cm}{1\ in} = 35396.05 = 35400$

3 SF

16) 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? 16) A

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

$d = \frac{m}{V}$ $\frac{14.01\ g}{8.4\ mL} = 1.7\ g/mL$

17) The Olympic Games shot put field event uses a 16 pound (lb) shot. Identify the correct solution map to convert from pounds to kilograms using prefix multipliers and the given conversions of 16 oz = 1 lb and 453.6 g = 16 oz. 17) C

A) $16\ lb \times \frac{1\ oz}{16\ lb} \times \frac{453.6\ g}{16\ oz} \times \frac{1\ kg}{10^3\ g}$

B) $16\ lb \times \frac{1\ lb}{16\ oz} \times \frac{16\ oz}{453.6\ g} \times \frac{10^3\ g}{1\ kg}$

C) $16\ lb \times \frac{16\ oz}{1\ lb} \times \frac{453.6\ g}{16\ oz} \times \frac{1\ kg}{10^3\ g}$

D) $16\ lb \times \frac{16\ oz}{1\ lb} \times \frac{453.6\ g}{16\ oz} \times \frac{10^3\ kg}{1\ g}$

18) Which state of matter has indefinite shape and is compressible? 18) D

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

19) Which of the following items is a mixture? 19) D

A) sugar
B) helium
C) water
D) brass
E) none of the above

20) Which of the following is a heterogenous mixture? 20) D

A) sugar water
B) air
C) milk
D) raisin bran
E) none of the above

21) Which of the following statements is FALSE? 21) E

A) Mixtures may be composed of two or more elements, two or more compounds, or a combination of both.
B) A pure substance may either be an element or a compound.
C) A mixture may be either homogeneous or heterogeneous.
D) Matter may be a pure substance or it may be a mixture.
E) All of the above statements are true.

22) An energy diagram that shows the reactants having greater energy than the products illustrates an 22) D

A) isothermic reaction.
B) exothermic reaction.
C) endothermic reaction.
D) impossible reaction.
E) none of the above

23) What is the value of 335 K on the Celsius temperature scale? 23) B

A) 66.4
B) 62
C) 167
D) 608
E) none of the above

335 K

K = C + 273.15

335 − 273.15

24) A 15.0 gram lead ball at 25.0°C was heated with 40.5 joules of heat. Given the specific heat of lead is 0.128 J/g•°C, what is the final temperature of the lead? 24) B

A) 0.844°C
B) 46.1°C
C) 21.1°C
D) 77.8°C
E) none of the above

$Q = mc\Delta t$ $\frac{Q}{mc} = \Delta t$

$40.5 = (15.0)(.128)(\Delta t)$

$\frac{40.5}{(15.0)(.128)} = \Delta t = 21.1°C$

21.1°C + 25°C = 46.1°C

25) The atomic mass unit is defined as: 25) D

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

26) Which of the following elements has an atomic number of 4? 26) C

A) H
B) C
C) Be
D) He
E) none of the above

27) What is the atomic symbol for tin? 27) D

A) Ti
B) Tn
C) Si
D) Sn
E) none of the above

28) Nonmetals are located where on the periodic table? 28) C

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

29) Cr is a member of which family? 29) E

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

30) How many electrons are in Br^-? 30) A

A) 36
B) 4
C) 7
D) 34
E) none of the above

31) How many protons and neutrons are in Cl-37? 31) A

A) 17 protons, 20 neutrons
B) 20 protons, 17 neutrons
C) 17 protons, 37 neutrons
D) 37 protons, 17 neutrons
E) none of the above

Cl-37 = 37 Cl

17 proton 20 neutr

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

32) The number 0.010100 has five significant figures. 32) A

33) In addition or subtraction, the result carries the same number of decimal places as the quantity carrying the fewest decimal places. 33) A

34) Zeros located after a number and after a decimal point are significant. 34) A

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

36) The mass of a proton is exactly the same as the mass of a neutron. 36) B