Use the Scantron for Questions 1-30. Mark only one answer unless instructed otherwise.

Chp 1 Basic questions

Scientific method

1. Testing a hypothesis is which step of the scientific method?
   (a) experimentation
   b) hypothesis formation
   c) educated guessing
   d) hypothesis rejection or confirmation
   e) theory formation

Metric system of measurement

2. Which of the following is a mass measurement (mark more than one answer).
   (A) cg B) mL C) dm D) yd (E) kg

Use these answers for questions 3–5 (there is only one correct answer)
A) 10^{-9} B) 10^{-6} C) 10^{-3} D) 10^{3} E) 10^{6}

3. Mg = _____ g [E]

4. 1 μL = _____ L [B]

5. 1 pm = _____ m [A]

6. The area of Asia is approximately 16.8 million square miles. Which of the following is the correct way to express this number in scientific notation?

   A. 1.68×10^{5} B. 1.68×10^{6} (C.) 1.68×10^{7} D. 16.8×10^{6} E. none of these

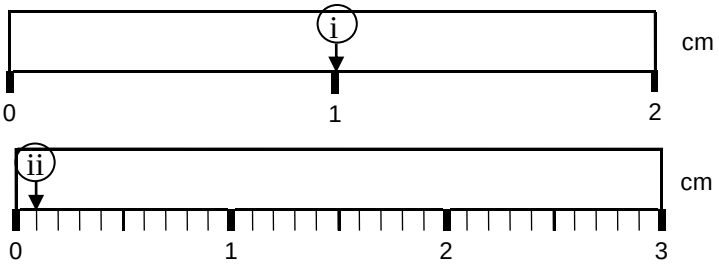
Accuracy and Precision

7. How would you describe the following density measurements in terms of accuracy and precision: 1.8 g/cm^3 , 1.7 g/cm^3 , 1.9 g/cm^3 , 1.8 g/cm^3 The accepted value for this density = 2.51 g/cm^3.

   A) accurate / precise (B) inaccurate / precise C) inaccurate / imprecise D) accurate / imprescise

Sig fig and uncertainty

8. Select the answer that has the correct number of sig. figs. for the values of the measurements shown at i and ii on these two rulers.



(A) i: 1 ii: 0.1
(B) i: 1.0 ii: 0.1
(C) i: 1.0 ii: 0.10
(D) i: 1.0 ii: 0.100
(E) i: 1.00 ii: 0.100

9.. How many significant figures are in each of the following quantities?

i. 0.00062 kg ii. 0.720 in. iii. 4.150×10^{3} lb

A. i. 2 ii. 2 iii. 3
B. i. 2 ii. 2 iii. 4
C. i. 5 ii. 3 iii. 4
(D.) i. 2 ii. 3 iii. 4
E. i. 5 ii. 3 iii. 4

18 pt

Chp 1 Challenge questions

Scientific method

10. Assume that you have four red balls. You do a test by weighing two balls and they have the same mass. Which of the following hypotheses can be eliminated:

(A) each ball has a different mass
B) there are balls of only two masses
C) balls of three different masses are present.
D) all balls have the same mass.
E) more than one hypotheses can be eliminated

Chp 2 Basic questions

Unit analysis *(Show all work for full credit)*

(6pt) The human body has 5.2 L of blood. What is this in pints?

?pt blood = 5.2L blood x 1.0567qt / 1L x 2pt / 1qt = 11pt blood

Rounding and sig fig

11. A solution is prepared by adding 1.77 grams of sodium nitrate, 2.4 grams of potassium chloride, and 0.973 gram of ammonium nitrite to 255 grams of water. Calculate the total mass and express the sum in the proper number of significant figures.

A) 2.6 x 10^2 g (B) 2.60 x 10^2 g C) 2.601 x 10^2 g D) 2.6014 x 10^2 g E) 2.60143 x 10^2 g

12. Complete the following operation:

$$\frac{4.77 \times 10^{-4}}{(2.73 \times 10^{4})(7.11 \times 10^{-8})}$$

A. 4.07 (B.) 0.246 C. 2.46 x 10^{-6} D. 1.24 x 10^{-4} E. 1.24 x 10^{-15}

13. Which of the following is an exact value?

A) 0.035 kg (B) 5 books C) 9.25 g D) 361 miles

Density, Percent, Temperature Calculations *(Show all work for full credit)*

(6 pt) The density of whole blood is 1.05 g/mL. A typical human has about 5.5 L of whole blood. How many pound is this?

5.5L x 1000mL/1L x 1.05g/1mL x 1lb/453.59g = 12.7 lb

(4 pt) Calculate the grams of alcohol, C_2H_5OH, in 440.0 grams of a 23.0% solution.

440g soln x 23.0g alcohol/100g soln. = 101g alcohol

14. Acetone boils at 56°C. Express this temperature in Kelvin.

A) -329 K B) -217 K C) 133 K D) 217 K (E) 329 K

26 pt

Chp 2 Challenge Question

15. Which of the following ratios (aka, conversion factors) **cannot** be derived from the following equality:

$$1.00\ A = 1.00 \times 10^{-10}\ m$$

A) $\frac{1.00\ A}{1.00 \times 10^{-10}\ m}$ B) $\frac{1.00 \times 10^{10}\ A}{1.00\ m}$ C) $\frac{1.00\ m}{1.00 \times 10^{10}\ A}$ D) $\frac{1.00 \times 10^{-10}\ m}{1.00\ A}$ (E) all are valid

Chp 3 Basic questions

16. Chemistry is the study of _____
   (A) matter and how it changes.
   B) energy and its various forms.
   C) space and planets.
   D) plants and their structure.
   E) animals and their behavior

17. Which of the following is a characteristic of a liquid?
   a) Shape is variable and is the same as the bottom of the container.
   b) Volume is constant.
   c) Its temperature is higher than the solid phase of the same substance.
   (d) All are correct for liquids
   e) None are correct for liquids
   f) States of Matter

Use the following answers for questions 4-5

A) Gas state B) Liquid state C) Solid state D) None of the states of matter.

18. The [A] state of matter is characterized by rapidly moving particles that are very far apart and randomly arranged.

19. The name for the change from the gaseous state to the [C] state is deposition.

The Chemical Elements and the Periodic Table

20. Which of the following is a pure substance that can be broken down by various chemical means into two or more simpler substances?
   a) mixture (b) compound c) element d) atom e) solution

(10 pts) Fill in the following table with the names or symbols of the elements, whichever is missing.

SYMBOL	NAME	SYMBOL	NAME
V	vanadium	C	**carbon**
P	**phosphorus**	**Sc**	scandium
Be	Beryllium	Ar	**argon**
Na	**sodium**	**Hg**	mercury
As	arsenic	Sn	**tin**

22 pt

21. Which is the most abundant element in the universe?
(a) hydrogen (b) oxygen (c) silicon (d) iron (e) none of the above

22. The two most abundant elements in the human body are:
A) oxygen and silicon
B) oxygen and hydrogen
C) carbon and hydrogen
D) oxygen and carbon
E) hydrogen and helium

Atomic Structure, Isotopes and Average Atomic Mass
(8 pt) Fill in this table with the missing values, isotope formulas or names. s

Isotope name	Isotope symbol	Atomic number	Mass number	Protons	Neutrons	Electrons	Charge	(C)ation (A)nion (N)eutral
Aluminum-31^{+3}	$^{31}_{13}Al^{3+}$	**13**	**31**	**13**	**18**	**10**	**3+**	**C**

(8 pt) Calculate the average atomic mass of an element that has two isotopes.

	Mass (amu)		Percent Abundance		
Isotope 1	120.903824	**X**	57.30	**/ 100 =**	**69.28**
Isotope 2	122.904222	**X**	42.70	**/ 100 =**	**52.48**
					121.76

What element is this?___Sb_____

The Mole
23. A thimble of water contains 4.0×10^{21} molecules. The number of moles of H_2O is:
A) 2.4×10^{45} B) 6.6×10^{-3} C) 6.6×10^{-23} D) 2.4×10^{23}

24. What is the mass of 3.61 moles of Ca?
A) 0.090 g B) 144 g C) 40.0 g D) 150 g

Chp 3 Challenge Questions
Elements, Compounds and the Periodic Table
Match the following terms with the substance described on the right. ***Mark all that apply on your scantron.***

25. A solid that is shiny, has luster, is malleable, ductile and conducts electricity. **D & E**	A. Arsenic
26. A nonmetal. **B & C**	B. He
27. A metalloid **A**	C. Neon
28. Alkali metal **D**	D. Rubidium
29. Period 4 Group 5A **E**	E. Tin
30. Two elements that have the same properties **B & C**	

36 pt

PERIODIC CHART OF THE ELEMENTS

1 H 1.00797																1 H 1.00797	2 He 4.0026
3 Li 6.939	4 Be 9.0122											5 B 10.811	6 C 12.0112	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.183
11 Na 22.9898	12 Mg 24.312											13 Al 26.9815	14 Si 28.086	15 P 30.9738	16 S 32.064	17 Cl 35.453	18 Ar 39.948
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.909	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc (99)	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.904	54 Xe 131.30
55 Cs 132.905	56 Ba 137.34	✳57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.980	84 Po (210)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	‡89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 ? (271)	111 ? (272)	112 ? (277)						

✳ Lanthanide Series

58 Ce 140.12	59 Pr 140.907	60 Nd 144.24	61 Pm (147)	62 Sm 150.35	63 Eu 151.96	64 Gd 157.25	65 Tb 158.924	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.97

‡ Actinide Series

90 Th 232.038	91 Pa (231)	92 U 238.03	93 Np (237)	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (249)	99 Es (254)	100 Fm (253)	101 Md (256)	102 No (256)	103 Lr (257)

USEFUL CONVERSION FACTORS AND RELATIONSHIPS

Length

SI unit: meter (m)

1 km = 0.62137 mi
1 mi = 5280 ft
= 1.6093 km
1 m = 1.0936 yd
1 in. = 2.54 cm (exactly)
1 cm = 0.39370 in.
1 Å = 10^{-10} m

Mass

SI unit: kilogram (kg)

1 kg = 2.2046 lb
1 lb = 453.59 g
= 16 oz
1 amu = $1.6605402 \times 10^{-24}$ g

2 pint = 1 qt
1 oz = 29.57 mL

Energy (derived)

SI unit: joule (J)

1 J = 1 kg-m^2/s^2
1 J = 0.2390 cal
= 1 C x 1 V
1 cal = 4.184 J
1 eV = 1.602×10^{-19} J

Pressure (derived)

SI unit: Pascal (Pa)

1 Pa = 1 N/m^2
= 1 kg/m-s^2
1 atm = 101,325 Pa
= 760 torr
= 14.70 lb/in^2
1 bar = 10^5 Pa

Volume (derived)

SI unit: cubic meter (m^3)

1 L = 10^{-3} m^3
= 1 dm^3
= 10^3 cm^3
= 1.0567 qt
1 gal = 4 qt
= 3.7854 L
1 cm^3 = 1 mL
1 in^3 = 16.4 cm^3