Chem 1141
Fall 2011
Exam 1A

Name: KEY

Please write your full name, and which exam version (1A) you have on the scantron sheet.

Multiple Choice. [3 points each.] Record your answers to the multiple choice questions on the scantron sheet.

Q1. Which of the following is an example of a heterogeneous mixture:
a) oil and water b) tea c) sodium chloride d) gold e) air

Q2. The element symbol Mn refers to which element:
a) magnesium b) molybdenum c) mantium d) manganese e) mono

Q3. The SI unit for mass is the:
a) pound b) ton c) tonne d) gram e) kilogram

Q4. The SI prefix meaning x 10^{-2} is:
a) tera b) mega c) milli d) centi e) deci

Q5. A piece of platinum metal with a density of 21.5 g/cm^3 has a mass of 41.1 g. What is its volume?
a) 884 cm^3 b) 1.91 cm^3 c) 0.523 cm^3 d) 62.2 cm^3 e) 19.6 cm^3

Q6. 210 ns is equal to how many ms?
a) 0.000 000 210 b) 0.000 210 c) 0.210 d) 210,000 e) 210,000,000

Q7. How many neutrons are in a single atom of calcium-39?
a) 6 b) 12 c) 19 d) 20 e) 39

Q8. Which element is an example of an alkaline-earth metal?
a) potassium b) beryllium c) iodine d) xenon e) aluminum

Q9. How many electrons are in an ion of Zn^{2+}?
a) 65 b) 28 c) 30 d) 32 e) 63

Q10. Which of the following compounds is correctly named as manganese(III) oxide?
a) MnO b) MnO_2 c) MnO_3 d) Mn_2O_3 e) Mn_3O_2

Q11. Which of the following compounds is correctly named as sulfuric acid?
a) H_2S b) H_2SO_3 c) H_2SO_4 d) H_3PO_4 e) S_8

Q12. What is the empirical formula of $K_2Cr_2O_7$?
a) $KCrO_5$ b) KCrO c) $KCrO_3$ d) $KCrO_4$ e) $K_2Cr_2O_7$

Q13. What is the correct formula of the ammonium ion?
a) Am^+ b) NH_3 c) NH_4^+ d) NH_4^- e) NH_2^-

Q14. Which of the following elements does **NOT** exist as a diatomic molecule in nature?
a) bromine b) nitrogen c) oxygen d) iodine e) sulfur

Q15. How many of the following compounds are ionic? NH_3, CH_4, N_2O_4, Li_2SO_4, ZnS
a) ZERO b) ONE c) TWO d) THREE e) FOUR

Short Response.

Show all work to receive credit. You must use the factor-label (conversion-factor) method for all conversions. Be sure to show all units and write your answers using the correct number of significant figures or decimal places.

Q16. [12 pts.] Write formulas for the following compounds:

a) iron(II) nitride Fe_3N_2

b) pentachlorine heptabromide Cl_5Br_7

c) calcium sulfate trihydrate $CaSO_4 \cdot 3H_2O$

d) magnesium bicarbonate $Mg(HCO_3)_2$

e) aluminum nitrite $Al(NO_2)_3$

f) hexasulfur nonoxide S_6O_9

Q17. [12 pts.] Name the following compounds.

a) $CuBr_2$ copper(II) bromide or cupric bromide

b) N_3Br_7 trinitrogen heptabromide

c) K_2SO_3 potassium sulfite

d) $NH_4C_2H_3O_2$ ammonium acetate

e) P_4F_{10} tetraphosphorus decafluoride

f) $Mg_3(PO_4)_2$ magnesium phosphate

Q18. [12 pts.] A gas company in Massachusetts charges \$1.30 for 15.0 ft^3 of natural gas. Convert this rate to dollars per liter of gas. Use the conversion-factor method. Note: 1 ft = 12 in (exact), and 1 in = 2.54 cm (exact).

$$\frac{\$1.30}{15.0\,ft^3}\left|\frac{(1\,ft)^3}{(12\,in)}\right|\left|\frac{(1\,in)^3}{(2.54\,cm)}\right|\frac{1000\,cm^3}{1\,L} = \frac{\$0.00306}{L} \quad (3\,s.f.)$$

Q19. [6 pts.] How many protons, neutrons, and electrons are in a single ion of aluminum-28? Show your work.

$Z = 13 \Rightarrow$ **$13p^+$**. $A = 28 = \#p^+ + \#n^0 = 13 + \#n^0$

$\Rightarrow \#n^0 = 28 - 13 =$ **$15n^0$**

13
Al

$Al^{3+} \Rightarrow$ loses $3e^-$ $\Rightarrow$ Atom = $13e^-$

Ion = **$10e^-$**

Q20. [15 pts.] Define the following terms:

a) Isotope

Atoms w/ same $\#p^+$, diff't $\#n^0$ (diff't mass #).

b) Intensive property

A property that does not depend on the size of the sample.

c) monatomic ion

An ion made from a SINGLE atom.

d) accurate measurement

A measurement which is close to the "true" value.

e) homogenous mixture

A mixture that has the same composition throughout.

Chem 1141
Fall 2011
Exam 1B

Name: KEY

Please write your full name, and which exam version (1B) you have on the scantron sheet.

Multiple Choice. [3 points each.] Record your answers to the multiple choice questions on the scantron sheet.

Q1. A piece of platinum metal with a density of 21.5 g/cm^3 has a mass of 41.1 g. What is its volume?
a) 884 cm^3 b) 1.91 cm^3 c) 0.523 cm^3 d) 62.2 cm^3 e) 19.6 cm^3

Q2. 210 μs is equal to how many ms?
a) 0.000 000 210 b) 0.000 210 c) 0.210 d) 210,000 e) 210,000,000

Q3. How many neutrons are in a single atom of potassium-39?
a) 26 b) 12 c) 19 d) 20 e) 39

Q4. Which element is an example of a halogen?
a) potassium b) beryllium c) iodine d) xenon e) aluminum

Q5. Which of the following is an example of a heterogeneous mixture:
a) oil and water b) tea c) sodium chloride d) gold e) air

Q6. The element symbol Mn refers to which element:
a) magnesium b) molybdenum c) mantium d) manganese e) mono

Q7. The SI unit for mass is the:
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Q9. How many electrons are in an ion of Cu^+?
a) 65 b) 28 c) 30 d) 32 e) 63

Q10. What is the correct formula of the ammonium ion?
a) Am^+ b) NH_4^+ c) NH_3 d) NH_4^- e) NH_2^-

Q11. Which of the following elements does **NOT** exist as a diatomic molecule in nature?
a) bromine b) carbon c) oxygen d) iodine e) hydrogen

Q12. How many of the following compounds are ionic? FeN, CH_4, N_2O_4, Li_2SO_4, ZnS
a) ZERO b) ONE c) TWO d) THREE e) FOUR

Q13. Which of the following compounds is correctly named as manganese(VI) oxide?
a) MnO b) MnO_2 c) MnO_3 d) Mn_2O_3 e) Mn_3O_2

Q14. Which of the following compounds is correctly named as sulfuric acid?
a) H_2SO_4 b) H_2SO_3 c) H_2S d) H_3SO_4 e) $S_8(aq)$

Q15. What is the empirical formula of $K_2Cr_2O_7$?
a) $KCrO_5$ b) KCrO c) $KCrO_3$ d) $KCrO_4$ e) $K_2Cr_2O_7$

Short Response.

Show all work to receive credit. You must use the factor-label (conversion-factor) method for all conversions. Be sure to show all units and write your answers using the correct number of significant figures or decimal places.

Q16. [12 pts.] Name the following compounds.

a) $FeCl_3$ iron(III) chloride OR ferric chloride

b) P_4I_7 tetraphosphorus heptaiodide

c) Na_2SO_4 sodium sulfate

d) $LiC_2H_3O_2$ lithium acetate

e) N_4O_9 tetranitrogen nonoxide

f) $Ca(HCO_3)_2$ calcium bicarbonate

Q17. [12 pts.] Write formulas for the following compounds:

a) cuprous chloride $CuCl$

b) heptachlorine pentabromide Cl_7Br_5

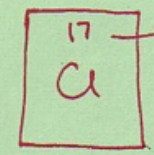
c) magnesium sulfate dihydrate $MgSO_4 \cdot 2H_2O$

d) sodium carbonate Na_2CO_3

e) aluminum hydroxide $Al(OH)_3$

f) hexachlorine dioxide Cl_6O_2

Q18. [6 pts.] How many protons, neutrons, and electrons are in a single ion of chlorine-37? Show your work.



atomic # = $\#p^+$ $\Rightarrow$ $17p^+$

$37 = \text{Mass \#} = \#p^+ + \#n^\circ$

$\Rightarrow 37 = 17 + \#n^\circ \Rightarrow 20n^\circ$

Cl^- ion : 1 more e^- than atom

$\Rightarrow 17 + 1 = 18e^-$

Q19. [15 pts.] Define the following terms:

a) Precise measurement

Measurements are close together

b) Extensive property

A property that depends on the amount of material present

c) Chemical property

A property that changes the identity of the substance once measured

d) Isotope

Atoms w/ same #p$^+$, diff't #n$^\circ$

e) Heterogeneous mixture

A mixture whose composition varies throughout.

Q20. [12 pts.] A gas company in Massachusetts charges \$1.70 for 19.0 ft^3 of natural gas. Convert this rate to dollars per liter of gas. Use the conversion-factor method. Note: 1 ft = 12 in (exact), and 1 in = 2.54 cm^3 (exact).

$$\frac{\$1.70}{19.0\,ft^3}\left|\frac{(1\,ft)^3}{(12\,in)}\right|\left|\frac{(1\,in)^3}{(2.54\,cm)}\right|\frac{1000\,cm^3}{1\,L} = \frac{\$0.00316}{L}$$