Chem 1141
Fall 2012
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 one of these is an example of a chemical property?
a) melting point b) density c) volume d) flammability e) mass

Q2. Which one of these is an example of an extensive property? (Depends on amount)
a) temperature b) boiling point c) melting point d) density e) volume

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

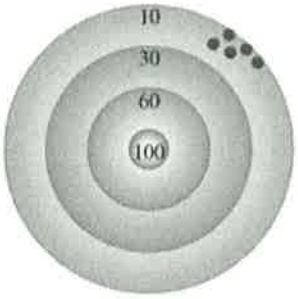
Q4. The SI prefix meaning $x10^{-9}$ is:
a) mega b) milli c) nano d) pico e) femto

Q5. The measurement 34.1 mL contains 3 significant figures. This means that the true measurement is in the range:
a) 34.0 – 34.2 mL b) 33.1 – 35.1 mL c) 34.0 – 34.1 mL d) 34.1 – 34.2 mL e) 34 – 35 mL

Q6. How many significant figures does the measurement 0.003020 mol contain?
a) 2 b) 3 c) 4 d) 6 e) 7

Q7. The correct result of the operation 34.0 – 25.0 is: (Subtraction: Digits after decimal point count!) (1dp, 1dp, 1dp)
a) 9.00 b) 9.0 c) 9 d) 9.0×10^{-1} e) 9.0×10^{-2}

Q8. A chemist was throwing darts at a board, aiming for the bulls-eye (center). The following set of throws could be considered to be:



a) accurate and precise
b) accurate but not precise
c) not accurate but precise
d) not accurate and not precise
e) none of the above

≈ size of nucleus ≈ size of cell ≈ size of child ≈ 60 miles!

Q9. The approximate size (diameter) of an atom is:

a) 1.0×10^{-15} m b) 1.0×10^{-10} m c) 1.0×10^{-5} m d) 1.0 m e) 1.0×10^{5} m

Q10. How many protons are contained in an atom of bromine-79?

a) 5 b) 11 c) 35 d) 79 e) 80

Q11. An example of a metalloid is:

a) silicon b) sulfur c) xenon d) uranium e) cesium

Q12. Which of these elements exists as a diatomic molecule in nature?

a) lithium b) titanium c) iodine d) phosphorus e) argon

Q13. How many electrons are in the Al^{3+} ion?

a) 10 b) 13 c) 16 d) 25 e) 28

Q14. What is the correct name for $CuSO_4$?

a) copper monosulfate b) copper sulfate c) copper(I) sulfate
d) copper(II) sulfate e) cuprous sulfate

Q15. What is the correct formula for methane?

a) NH_3 b) PH_3 c) CH_4 d) H_2SO_4 e) HCl

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.] Convert a concentration of 0.31 μg/cm^3 to units of mg/in^3.

Note: 1 in = 2.54 cm exactly.

$\mu g = 10^{-6}\ g$, $mg = 10^{-3}\ g$

$$\frac{0.31\ \mu g}{cm^3} \left|\frac{(2.54\ cm)^3}{1\ in}\right| \frac{10^{-6}\ g}{\mu g} \left|\frac{mg}{10^{-3}\ g}\right| = 0.0051\ mg/in^3 \quad (2\ s.f.)$$

Q17. [6 pts.] Compute the following to the correct number of significant figures / decimal places:

a) 0.021 x 13.1 = 0.28 (2 s.f.)

b) 12.33 – 11.23 = 1.10 (2 d.p.)

Q18. [6 pts.] Gold has a density of 19.3 g/cm^3. What mass of gold would have a volume of 42.0 cm^3?

$d = m/V \Rightarrow m = d \times V = \frac{19.3\,g}{cm^3} \times 42.0\,cm^3 = 811\,g$ (3 s.f.)

Q19. [10 pts.] Write formulas for the following compounds:

a) trisulfur heptafluoride S_3F_7

b) lead(IV) sulfate $Pb(SO_4)_2$

c) sodium acetate $NaC_2H_3O_2$

d) magnesium nitrite $Mg(NO_2)_2$

e) pentanitrogen decoxide N_5O_{10}

Q20. [10 pts.] Name the following compounds:

a) $MgCO_3$ magnesium carbonate

b) P_2N_8 diphosphorus octanitride

c) $Fe(HCO_3)_3$ iron(III) bicarbonate

d) $Ca_3(PO_4)_2 \cdot 4H_2O$ calcium phosphate tetrahydrate

e) Cl_3I_9 trichlorine nonaiodide

Q21. [4 pts.] What is the empirical formula of $C_6H_3Cl_3$?

C_2HCl

Q22. [7 pts.] How many protons, neutrons, and electrons are there in the common ION of bromine-81?

$^{81}_{35}Br^-$

35 p^+ , 46 n° , 36 e^-

35 p^+: Z

46 n°: $A = 81 = \#p^+ + \#n^\circ$

$= 35 + \#n^\circ$

$\Rightarrow \#n^\circ = 46$

36 e^-: -ve charge means it's gained 1 e^-

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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. The approximate size (diameter) of an atom is:
a) 1.0×10^{-15} m b) 1.0×10^{-10} m c) 1.0×10^{-5} m d) 1.0 m e) 1.0×10^{5} m

Q2. How many protons are contained in an atom of bromine-79?
a) 5 b) 11 c) 35 d) 79 e) 80

Q3. An example of a metalloid is:
a) silicon b) sulfur c) xenon d) uranium e) cesium

Q4. Which of these elements exists as a diatomic molecule in nature?
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a) 10 b) 13 c) 16 d) 25 e) 28

Q6. What is the correct name for $CuSO_4$?
a) copper monosulfate b) copper sulfate c) copper(I) sulfate
d) copper(II) sulfate e) cuprous sulfate

Q7. What is the correct formula for sulfuric acid?
a) NH_3 b) PH_3 c) CH_4 d) H_2SO_4 e) HCl

Q8. Which one of these is an example of a chemical property?
a) melting point b) density c) volume d) flammability e) mass

Q9. Which one of these is an example of an extensive property?
a) temperature b) boiling point c) melting point d) density e) volume

Q10. The base SI unit for mass is:
a) gram b) pound c) tonne d) liter e) kilogram

Q11. The SI prefix meaning $x10^{-12}$ is:
a) mega b) milli c) nano d) pico e) femto

Q12. The measurement 34.1 mL contains 3 significant figures. This means that the true measurement is in the range:
a) 34.0 – 34.2 mL b) 33.1 – 35.1 mL c) 34.0 – 34.1 mL d) 34.1 – 34.2 mL e) 34 – 35 mL

Q13. How many significant figures does the measurement 0.003020 mol contain?

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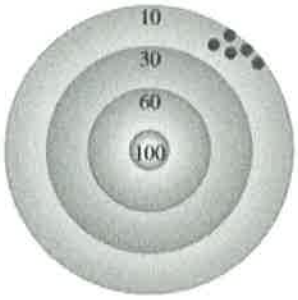

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d) magnesium nitrite $Mg(NO_2)_2$

e) pentanitrogen decoxide N_5O_{10}

Q18. [7 pts.] How many protons, neutrons, and electrons are there in the common ION of aluminum-28?

$13p^+$, $15n^\circ$, $10e^-$

↳ missing 3 e^- from atom since 3+ charge.

$^{28}_{13}Al^{3+}$

Q19. [10 pts.] Name the following compounds:

a) $MgSO_3$ magnesium sulfite

b) P_3N_9 triphosphorus nonanitride

c) $Li_2CO_3 \cdot 5H_2O$ lithium carbonate pentahydrate

d) $Cu(HCO_3)_2$ copper(II) bicarbonate

e) Cl_2I_8 dichlorine octaiodide

Q20. [12 pts.] Convert a concentration of 0.31 ng/in^3 to units of μg/cm^3.

Note: 1 in = 2.54 cm exactly.

$ng = 10^{-9}g$, $\mu g = 10^{-6}g$

$$0.31 \frac{ng}{in^3} \left| \left(\frac{1\ in}{2.54\ cm}\right)^3 \right| \frac{10^{-9}g}{ng} \left| \frac{\mu g}{10^{-6}g} \right| = 1.9 \times 10^{-5} \frac{\mu g}{cm^3}$$

Q21. [6 pts.] Gold has a density of 19.3 g/cm^3. What mass of gold would have a volume of 2.30 cm^3?

$d = m/V \Rightarrow m = V \times d$

$= 2.30\ cm^3 \times \frac{19.3g}{cm^3} = 44.4g$

Q22. [4 pts.] What is the empirical formula of $C_9H_6Cl_6$?

$C_3H_2Cl_2$