

CHEM 101
Second Semester (032)
First Major Exam (March 23, 2004)
=====

Instructions:

1. Print your name, student ID, and section number on the test answer form (upper left corner).
2. Check that the test code on your answer form agrees with the test code on your exam booklet.
3. Code your student ID, section number, and test code on your test answer form.
4. Code your answers on the answer form. You must not give more than one answer per question.

=====		
Instructors	Sections	Lecture Timings
=====		
Dr. Maung	1, 2, 3, 4	8:00 - 8:50 AM

Dr. Oweimreen	5, 6, 7, 8	10:00 - 10:50 AM

Dr. Klein	9, 10, 11, 12	11:00 - 11:50 AM

Dr. Morsy	13, 14, 15, 16	2:10 - 3:00 PM

Dr. Khaled	17, 18, 19, 20	1:10 - 2:00 PM

QUESTION NO: 1

The final answer of the operations below to the correct number of significant figures is,

$$(0.00027 \times 65.60) + 2.0030$$

- A. 2.021
- B. 2.0207
- C. 2.0
- D. 2.02
- E. 2.020712

$$\begin{array}{r} 0.00027 \\ \times 65.60 \\ \hline 0.017712 \end{array}$$

least sig. fig.
But do not round till end

$$\begin{array}{r} 0.017712 \\ + 2.0030 \\ \hline 2.020712 \\ \text{Round} \\ = 2.021 \end{array}$$

least decimal

QUESTION NO: 2

Consider the data obtained for the length of an object as measured by three students(A, B, C).

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
A	14.8	14.1	14.5	14.6	14.2
B	14.8	14.2	14.6	14.5	14.8
C	14.6	14.5	14.5	14.4	14.6

The length is known to be 14.54 cm. Which of the conclusions is the most correct?

- A. Student C has done the most precise and accurate work.
- B. Student C has done the most precise work and student A the most accurate.
- C. Student A has done the most precise work and student C the most accurate.
- D. Student C has done the most precise work and student B the most accurate.
- E. Student B has done the most precise work and student C the most accurate.

QUESTION NO: 3

The radius of the hydrogen nucleus is 1.0×10^{-14} m and its mass is 1.67×10^{-24} g. What is the density of the nucleus in kg/m^3 ?

(The volume of a sphere is $\frac{4}{3} \times \pi \times r^3$ where r is the radius)

- A. 4.0×10^{14}
- B. 4.0×10^{12}
- C. 4.4×10^{10}
- D. 4.0×10^{16}
- E. 4.4×10^7

QUESTION NO: 4

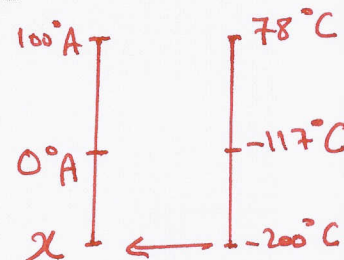
Assume that the freezing point and melting point of alcohol, which are -117°C and 78°C respectively, are defined as 0°A and 100°A respectively. What is the equivalent of -200°C in $^\circ\text{A}$?

- A. -43
- B. -49
- C. -54
- D. -61
- E. -34

$$\frac{x - 0}{0 - 100} = \frac{-200 - (-117)}{-117 - 78} \Rightarrow x = -43$$

or

$$\frac{x - 0}{x - 100} = \frac{-200 - (-117)}{-200 - 78} \Rightarrow x = -43$$



QUESTION NO: 5

The formula for magnesium chlorite is,

- A. $\text{Mg}(\text{ClO})_{2,2}$
- B. MgClO_4
- C. MgClO_3
- D. $\text{Mg}(\text{ClO})_{3,2}$
- E. $\text{Mg}(\text{ClO})_2$

QUESTION NO: 6

The name for CaS is,

- A. calcium sulfide.
- B. sulfite calcium.
- C. calcium(II) sulfate.
- D. calcium sulfate.
- E. calcium disulfite.

S^{2-} Sulfide

$(\text{H}^- \text{hydride})$

QUESTION NO: 7

Of the following five results for the analysis of a pure compound X_nY_m , one of the results is not correct.

$n \quad m$

Which one is not correct?

$m \neq m$

- A. mass of X = 3.351 g; mass of Y = 3.649 g
- B. mass of X = 1.309 g; mass of Y = 1.691 g
- C. mass of X = 1.746 g; mass of Y = 2.254 g
- D. mass of X = 2.182 g; mass of Y = 2.818 g
- E. mass of X = 2.618 g; mass of Y = 3.382 g

$m/m = 1$

QUESTION NO: 8

Which of the following statements is not correct?

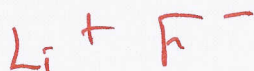
(and neutrons)

- A. The mass of an atom is the mass of the protons in it.
- B. The atom is mostly empty space.
- C. Most of the mass of the atom is in its nucleus.
- D. In neutral atoms the number of protons equal the number of electrons.
- E. Atoms of isotopes contain different numbers of neutrons.

 QUESTION NO: 9

Which of the following elements form an ionic compound?

- A. Li and F
- B. K and Na
- C. N and H
- D. H and O
- E. C and O



 QUESTION NO: 10

If 1.345 grams of an oxide of osmium(Os) are analyzed and found to contain 1.150 grams of osmium, the empirical formula of this compound is,

- A. OsO_2
- B. OsO_4
- C. OsO
- D. Os_2O
- E. Os_4O

$$\begin{array}{rcl} \text{Os} & 190.2 & \text{O} & 16.00 \\ \hline & 190.2 & & \\ & \hline & 190.2 & & \\ & 190.2 + 32.00 & = & 0.8560 \end{array}$$

Given ratio = $\frac{1.150}{1.345} = 0.8550$

 QUESTION NO: 11

Antimony(Sb) occurs naturally in two major isotopic forms: ^{121}Sb with mass 120.9038 amu and ^{123}Sb with mass 122.9041 amu. Determine the the percentage natural abundance of the ^{123}Sb isotope?

- A. 42.5%
- B. 57.5%
- C. 50.0%
- D. 24.5%
- E. 75.5%

Let x the percentage of ^{123}Sb

$$\Rightarrow (122.9041 \times x) + [120.9038 \times (1-x)] = \text{Atomic Mass}$$

$$= 121.75$$

$$\Rightarrow x = 0.4225$$

$$x = 42.3\%$$

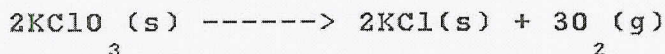
QUESTION NO: 12

Of the compounds listed, which has the highest percentage of nitrogen by mass?

- A. NH_3
 B. $\text{Cu}(\text{NH}_3)_4\text{SO}_4$
 C. $\text{Fe}(\text{NO}_3)_3$
 D. NH_4NO_3
 E. NH_4OH

QUESTION NO: 13

Consider the following reaction:



Suppose a 1.00 g sample of $\text{KClO}_3(\text{s})$ produces 0.11 g of $\text{O}_2(\text{g})$. What is the percent yield of the reaction?

- A. 28%
 B. 54%
 C. 39%
 D. 80%
 E. 15%

$$\begin{aligned} 2\text{KClO}_3 &\rightarrow 2\text{KCl} + 3\text{O}_2 \\ 2 \times 122.55 \text{ g/mole} &\longrightarrow 3 \times 32.00 \text{ g/mole} \\ 1.00 \text{ g} &\longrightarrow m_{\text{O}_2} \text{ Theoretical} \\ m_{\text{O}_2} &= 0.392 \text{ g} \\ \% \text{ yield} &= \frac{m_{\text{O}_2} \text{ Actual}}{m_{\text{O}_2} \text{ Theoretical}} = \frac{0.11}{0.392} = 0.28 = 28\% \end{aligned}$$

QUESTION NO: 14

Which of the following has smallest number of atoms?

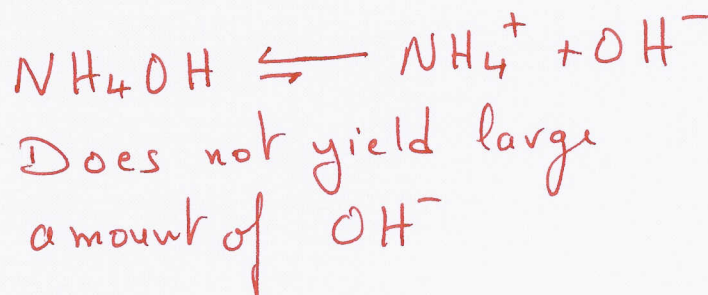
- A. 1.92 g of iridium atoms
 B. 1.10 g of hydrogen atoms
 C. 3.55 g of chlorine atoms
 D. 4.50 g of beryllium atoms
 E. 7.66 g of sodium atoms

$$\text{Ir } 192.22 \text{ g/mole}$$

 QUESTION NO: 15

Which of the following bases is a weak base?

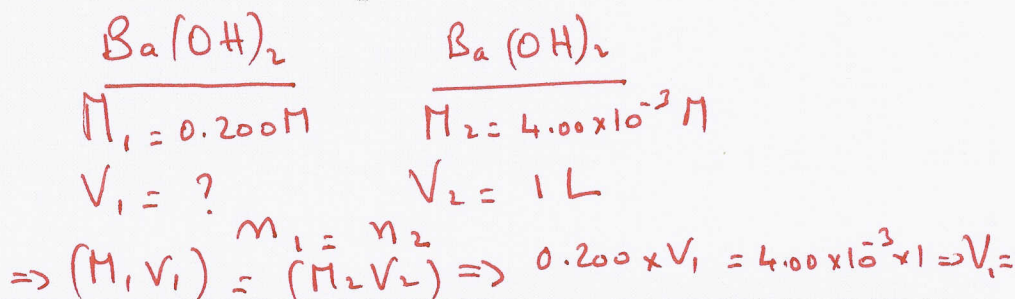
- A. $\text{NH}_3(\text{aq})$
 B. $\text{NaOH}(\text{aq})$
 C. $\text{KOH}(\text{aq})$
 D. $\text{Ba}(\text{OH})_2(\text{aq})$
 E. $\text{CsOH}(\text{aq})$



 QUESTION NO: 16

What volume of 0.200 M $\text{Ba}(\text{OH})_2$ is required to produce
 1.00 L of a 4.00×10^{-3} M $\text{Ba}(\text{OH})_2$ solution?

- A. 20.0 mL
 B. 25.0 mL
 C. 50.0 mL
 D. 40.0 mL
 E. 12.5 mL



 QUESTION NO: 17

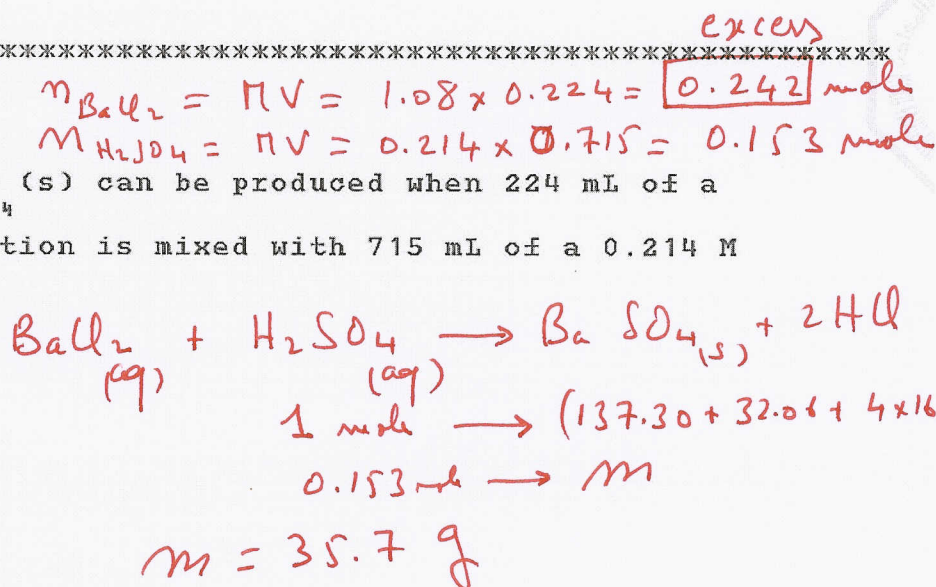
Aqueous KOH is mixed with aqueous $\text{Co}(\text{NO}_3)_3$. What is the
 net ionic reaction that occurs?

- A. $3\text{OH}^-(\text{aq}) + \text{Co}^{3+}(\text{aq}) \rightarrow \text{Co}(\text{OH})_3(\text{s})$
 B. $\text{OH}^-(\text{aq}) + \text{Co}^{2+}(\text{aq}) \rightarrow \text{CoOH}^+(\text{aq})$
 C. $2\text{OH}^-(\text{aq}) + \text{Co}^{2+}(\text{aq}) \rightarrow \text{Co}(\text{OH})_2(\text{s})$
 D. $3\text{KOH}(\text{aq}) + \text{Co}(\text{NO}_3)_3(\text{aq}) \rightarrow \text{Co}(\text{OH})_3(\text{s}) + 3\text{KNO}_3(\text{aq})$
 E. $2\text{KOH}(\text{aq}) + \text{Co}(\text{NO}_3)_2(\text{aq}) \rightarrow \text{Co}(\text{OH})_2(\text{s}) + 2\text{KNO}_3(\text{aq})$

QUESTION NO: 18

What mass of BaSO_4 (s) can be produced when 224 mL of a 1.08 M BaCl_2 solution is mixed with 715 mL of a 0.214 M H_2SO_4 solution?

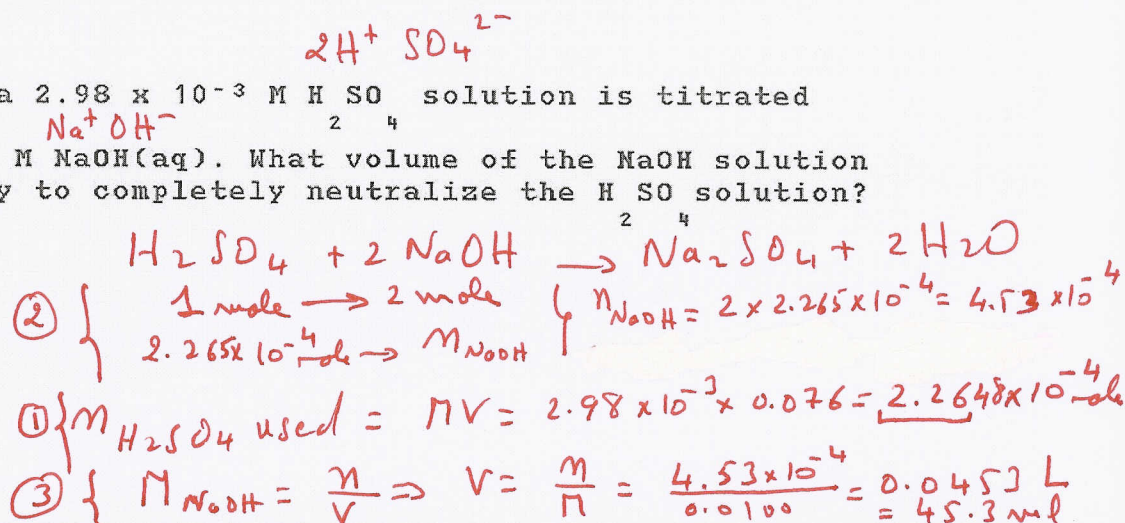
- A. 35.7 g
B. 28.2 g
C. 56.4 g
D. 71.4 g
E. 112 g



QUESTION NO: 19

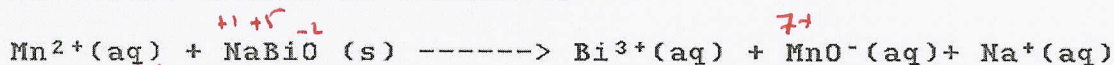
76.0 mL of a 2.98×10^{-3} M H_2SO_4 solution is titrated with 0.0100 M NaOH (aq). What volume of the NaOH solution is necessary to completely neutralize the H_2SO_4 solution?

- A. 45.3 mL
B. 15.7 mL
C. 14.5 mL
D. 31.3 mL
E. 22.6 mL



QUESTION NO: 20

What is the sum of all stoichiometric coefficients of the products if the following redox reaction occurring in acidic medium is balanced?



- A. 19
B. 21
C. 40
D. 9
E. 14

