

CHE 105 Summer 2016 EX2

Your Name: _____

Your ID: _____

Question #: 1

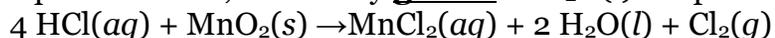
How many grams of H_2SO_4 (molar mass = 98.08 g/mol) are in 0.23 moles of H_2SO_4 ? Do **not** include units in your answer.

 1 grams

1. _____

Question #: 2

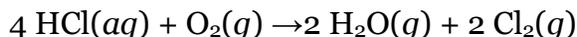
When 2.8 grams of $\text{HCl}(aq)$ reacts with an excess of $\text{MnO}_2(s)$ according to the balanced chemical equation below, how many **grams** of $\text{H}_2\text{O}(l)$ are produced?



- A. 0.69 g
 - B. 1.4 g
 - C. 0.92 g
 - D. 2.3 g
-

Question #: 3

A maximum of 1 grams of Cl_2 can be produced from the reaction of 12.0 grams of HCl with 15.0 grams of O_2 .

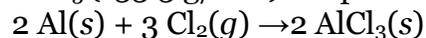


Report your answer with **three** significant digits, in the form 2.22E2 or 2.22E-2 if you use scientific notation. Do **NOT** include units in your answer.

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Question #: 4

When 7.9 grams of Al (26.98 g/mol) are reacted with excess Cl₂ (70.90 g/mol), 28 grams of AlCl₃ (133.3 g/mol) are produced according to the balanced chemical equation:



The yield of aluminum chloride is 1 %.

Report your answer with **two** significant figures. Do **NOT** use scientific notation. Do **NOT** include units in your answer.

1. _____

Question #: 5

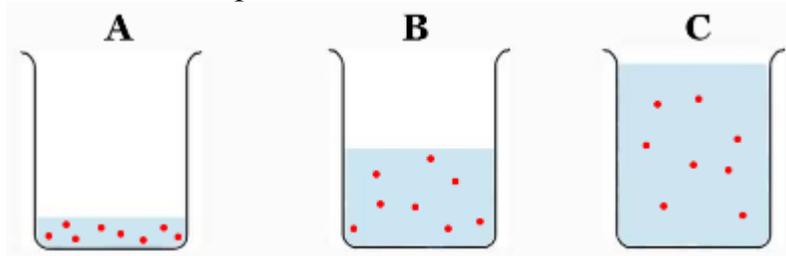
What is the **molarity** of a solution formed by dissolving 15.1 g of Ca(NO₃)₂ (molar mass 116.1 g/mol) in enough water to yield 120.0 mL of solution?

- A. 2.74 M
 - B. 1.08 M
 - C. 3.78 x 10⁻³ M
 - D. 0.239 M
-

Question #: 6

Select the **true** statement below about solutions A, B, and C.

Each red dots represents an identical amount of solute and the light blue represents solvent.



- A. Solution C has a lower concentration than solution A.
 - B. Solution B is more dilute than solution C.
 - C. Solutions A and B have the same concentration.
 - D. Solution A is the least concentrated.
-

Question #: 7

Which of the following is a **nonelectrolyte** when dissolved in water?

- A. CH₃COOH (acetic acid)
 - B. KCl (potassium chloride)
 - C. NaOH (sodium hydroxide)
 - D. C₁₂H₂₂O₁₁ (sucrose)
-

Question #: 8

What is the **solid product** when aqueous solutions of AgNO₃ and KCl are combined?

- A. KNO₃
 - B. K₂NO₃
 - C. NO₃Cl
 - D. AgCl
-

Question #: 9

What is the **net ionic** equation for the reaction that occurs when aqueous solutions of CaI₂ and K₂SO₄ are mixed?

- A. $K^+(aq) + I^-(aq) \rightarrow KI(s)$
 - B. $Ca^{2+}(aq) + SO_4^{2-}(aq) \rightarrow CaSO_4(s)$
 - C. $2K^+(aq) + SO_4^{2-}(aq) + Ca^{2+}(aq) + 2I^-(aq) \rightarrow CaSO_4(s) + KI(s)$
 - D. $K^+(aq) + I^-(aq) \rightarrow KI(aq)$
-

Question #: 10

A 15 mL sample $\text{Ca(OH)}_2(aq)$ is titrated with 33 mL of a 0.24 M hydrobromic acid (HBr) solution to reach the equivalence point. The concentration of the Ca(OH)_2 solution is 1 M. Report your answer with **two** significant digits, in the form 2.2E2 or 2.2E-2 if you use scientific notation. Do **NOT** include units in your answer.

1. _____

Question #: 11

The oxidation number of manganese in KMnO_4 is 1.

1. _____

Question #: 12

Select the **two true** statements about the following redox reaction.
 $\text{Mg}(s) + \text{Br}_2(l) \rightarrow \text{MgBr}_2(s)$

- A. Mg is oxidized.
 - B. Mg is reduced.
 - C. Mg is the oxidizing agent.
 - D. Mg is the reducing agent.
-

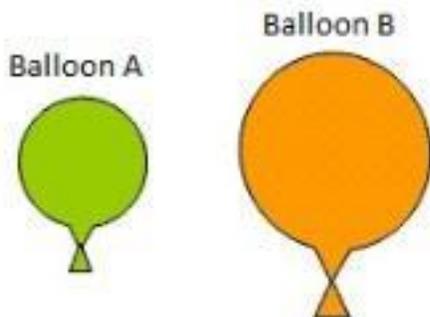
Question #: 13

A sample of $\text{He}(g)$ occupies 22 L at 124 °C at a certain pressure. The volume of $\text{He}(g)$ is 1 L at 65 °C and the same pressure. Report your answer with **two** significant digits. Do **NOT** include units in your answer.

1. _____

Question #: 14

At the same temperature and pressure, balloons A and B contain the same **mass** of gas. One of them contains helium and the other contains xenon. Balloon 1 [A or B] contains helium.



1. _____

Question #: 15

Select the statement that is **consistent** with the ideal gas law.

- A. The pressure of the gas is inversely proportional to the volume of the gas.
 - B. The pressure of the gas is inversely proportional to the number of moles of gas.
 - C. The ideal gas constant is dependent on the identity of the gas.
 - D. The pressure of the gas is inversely proportional to the absolute temperature of the gas.
-

Question #: 16

A 2.45 L container is filled with nitrogen at 37 °C to a pressure of 2.15 atm. How many **moles** of nitrogen are in this container?

- A. 0.207 mol
 - B. 1.31 mol
 - C. 0.565 mol
 - D. 5.83 mol
-

Question #: 17

What is the **density** of $\text{H}_2\text{O}(g)$ at $20.0\text{ }^\circ\text{C}$ and 2.40 atm ?

- A. 1.80 g/L
 - B. 2.06 g/L
 - C. 4.21 g/L
 - D. 1.34 g/L
-

Question #: 18

The **partial pressure** of a gas in a mixture is

- A. the total pressure of the mixture multiplied by the mole fraction of the gas.
 - B. always highest for a noble gas.
 - C. moles of the gas divided by the total pressure of the mixture.
 - D. the same for all components of the mixture, regardless of mole fraction.
-

Question #: 19

What **volume** of carbon monoxide is produced at $25\text{ }^\circ\text{C}$ and 1.82 atm when 5.2 grams of carbon is consumed in the following reaction?



- A. 5.8 L
 - B. 2.4 L
 - C. 5.0 L
 - D. 4.4 L
-

Question #: 20

Which of the following statements is a postulate of kinetic molecular theory?

- A. The size of a gas particle is negligibly small.
 - B. The average kinetic energy of a gas particle is inversely proportional to the temperature in Kelvin.
 - C. Gas particles do not collide with each other.
 - D. All gas molecules are attracted to each other.
-

Question #: 21

Which statement is true regarding the rate of effusion of $\text{N}_2(g)$ and $\text{Ne}(g)$ from a container?

- A. N_2 will effuse at the same rate as Ne.
 - B. N_2 will effuse faster than Ne.
 - C. N_2 will effuse slower than Ne.
 - D. N_2 will not effuse from the container but Ne will effuse.
-

Question #: 22

Select two conditions that cause a real gas to act less than ideal.

- A. high pressure
 - B. high temperature
 - C. low temperature
 - D. low pressure
-

Question #: 23

Which of the following statements about the nature of energy is **false**?

- A. Thermal energy is a specific type of kinetic energy associated with molecular motion.
 - B. Energy is absorbed by a system during an endothermic reaction.
 - C. Energy can be created or destroyed in a chemical reaction.
 - D. Energy is the capacity to do work.
-

Question #: 24

If a system **does** 430 kJ of work and **absorbs** 250 kJ of heat, what is the change in internal energy (ΔE) of the system?

- A. 180 kJ
 - B. -180 kJ
 - C. 680 kJ
 - D. -680 kJ
-

Question #: 25

A tanker truck carrying 1.30×10^2 kg of 18.4 M sulfuric acid tips over and spills its load. If the density of H_2SO_4 is 1.84 kg/L, how many **kilograms** of sodium hydroxide (NaOH, molar mass = 40.0 g/mol) are needed to neutralize the acid?

1 kilograms

Give your answer using the **correct** number of significant figures and use the format 2.22E2 or 2.22E-2 for scientific notation.

1. _____

DRAFT
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Periodic Table of the Elements

1	1A	2	2A											13	14	15	16	17	18
1	H											He							
2	Li	Be											B	C	N	O	F	Ne	
3	Na	Mg	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
6	Cs	Ba	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb			
7	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No			

Molar volume of ideal gas at STP = 22.4 L	Ideal gas constant: $R = 8.314 \text{ J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$	Speed of light, $c = 3.00 \times 10^8 \text{ m}\cdot\text{s}^{-1}$
Faraday constant, $F = 9.6485 \times 10^4 \text{ C}\cdot\text{mol}^{-1}$	$R = 1.987 \text{ cal}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$	Rydberg constant, $R_H = 2.18 \times 10^{-18} \text{ J}$
Avogadro's number, $N = 6.022 \times 10^{23} \text{ mol}^{-1}$	$R = 8.206 \times 10^{-2} \text{ L}\cdot\text{atm}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$	Electron charge, $e = 1.602 \times 10^{-19} \text{ C}$
Planck's constant, $h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$		Atomic mass unit, $u = 1.6605 \times 10^{-24} \text{ g}$

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Question #: 1

How many grams of H_2SO_4 (molar mass = 98.08 g/mol) are in 0.23 moles of H_2SO_4 ? Do **not** include units in your answer.

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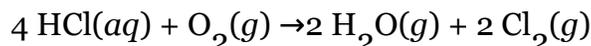
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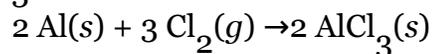


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1. 11.7|1.17E1|11.6|1.16E1|

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When 7.9 grams of Al (26.98 g/mol) are reacted with excess Cl₂ (70.90 g/mol), 28 grams of AlCl₃ (133.3 g/mol) are produced according to the balanced chemical equation:



The yield of aluminum chloride is 1 %.

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1. 72|71|

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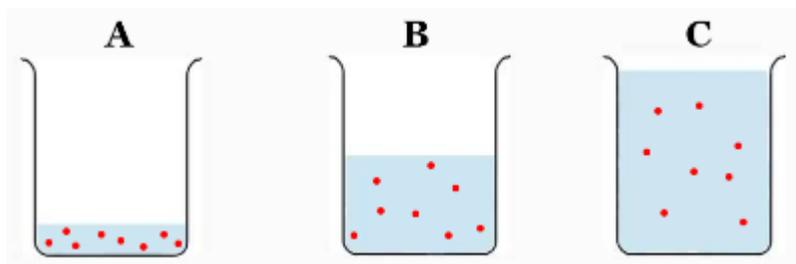
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1. 0.26|2.6E-1|

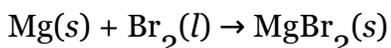
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1. +7|+ 7|+seven|plus seven|seven|7|

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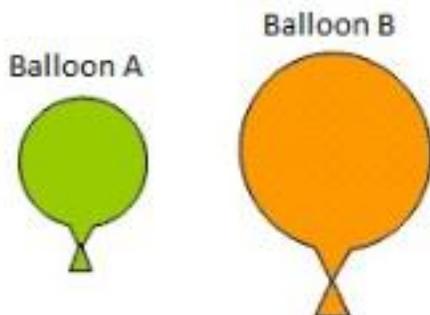
The volume of $\text{He}(g)$ is 1 L at 65 °C and the same pressure.

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1. 19|1.9E1|

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At the same temperature and pressure, balloons A and B contain the same **mass** of gas. One of them contains helium and the other contains xenon. Balloon 1 [A or B] contains helium.



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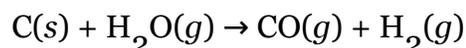
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What volume of carbon monoxide is produced at 25 °C and 1.82 atm when 5.2 grams of carbon is consumed in the following reaction?



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1. 104|1.04E2|