

Chemistry 222 Exam I Review

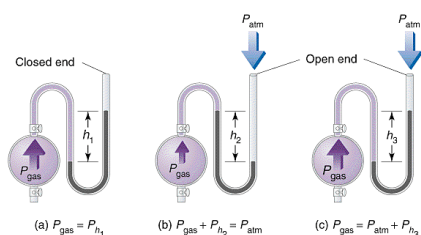
Chapters 7, 8 and 9

me watching my
drink warm up
my ice cubes



Chemistry 222
Professor Michael Russell

MAR

Last update:
4/27/26

MAR

Midterm I

Chapters 7, 8 and 9

- Bring: calculator, pencil, "Calorimetry" lab, Exam Prep Worksheet I, "Graphing" printed lab
- 12 multiple choice questions, 4 short answer questions, ~90 minutes in length
- Returned following lab period with "summary sheet" **Good luck with your studying!**

Let's start the review!



L1: Mon, 7/6 8:30 AM, AC 2507

Check with instructor to ensure correct dates and times!



Which statement regarding this reaction is true?

- 3 moles of S are produced per mole of H_2S .
- 1 mole of SO_2 is consumed per mole of H_2S .
- 1 mole of H_2O is produced per mole of H_2S .
- The total number of moles of products is always equal to the total number of moles of reactants used.
- None of these statements are true.

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In the reaction of 2.0 mol of CCl_4 with an excess of HF, 1.7 mol of CCl_2F_2 is obtained.

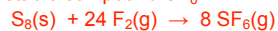


Which statement is true here?

- The theoretical yield for CCl_2F_2 is 1.7 mol.
- The actual yield for CCl_2F_2 is 1.0 mol.
- The percent yield for the reaction is 85%.
- Theoretical yield cannot be determined unless the exact amount of HF used is known.
- Infinite diversity in infinite combinations (IDIC)

MAR

Burning sulfur in an atmosphere of fluorine produces the very stable compound SF_6 .

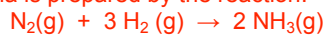


If you wish to produce 2.50 moles of SF_6 , you will need to use:

- 0.313 moles of S_8 and 7.50 moles of F_2 .
- 1.00 moles of S_8 and 24.0 moles of F_2 .
- 0.125 moles of S_8 and 3.00 moles of F_2 .
- 8.00 moles of S_8 and 24.0 moles of F_2 .
- More information is required to answer this question.

MAR

Ammonia is prepared by the reaction:



If 10.0 mol of N_2 are mixed with 25.0 mol of H_2 , the amount of NH_3 produced will be:

- 20.0 mol NH_3
- 16.7 mol NH_3
- 37.5 mol NH_3
- 25.0 mol NH_3
- 35.0 mol NH_3

MAR

What mass of Na_2CO_3 (molar mass = 106.0 g/mol) is required for complete reaction with 25.0 mL of 0.155 M HNO_3 ?



- A. 0.410 g
- B. 205 g
- C. 0.205 g
- D. 0.122 g
- E. 37 kg

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A sample of gas has a volume of 222 mL at 695 mm Hg and 0 °C. What would be the volume of this same sample of gas if it were measured at 333 mm Hg and 0 °C?

- A. 894 mL
- B. 463 mL
- C. 657 mL
- D. 359 mL
- E. -155 mL

MAR

Gas density: Which has the greatest density at 25 °C and 1.00 atm pressure?

- A. O_2
- B. N_2
- C. H_2
- D. CO_2
- E. Xe

MAR

Diborane reacts with O_2 to give boric oxide and water vapor:



If 1.5 L of B_2H_6 is mixed with O_2 , what volume of O_2 is required for reaction? Assume constant T and P.

- A. 1.5 L
- B. 4.5 L
- C. 0.50 L
- D. 6.0 L
- E. 0.0 L

MAR

Diborane, B_2H_6 , burns in air according to the equation:



There are three gases involved in the reaction above. Place them in order of increasing velocity.

- A. $\text{B}_2\text{H}_6 < \text{O}_2 < \text{H}_2\text{O}$
- B. $\text{O}_2 < \text{B}_2\text{H}_6 < \text{H}_2\text{O}$
- C. $\text{H}_2\text{O} < \text{B}_2\text{H}_6 < \text{O}_2$
- D. $\text{O}_2 < \text{H}_2\text{O} < \text{B}_2\text{H}_6$

MAR

Equal masses of helium and neon are placed in separate containers of equal V at the same T. Compare the pressures of the gases.

- A. $P(\text{He}) > P(\text{Ne})$
- B. $P(\text{Ne}) > P(\text{He})$
- C. $P(\text{He}) = P(\text{Ne})$
- D. Too much pressure!

MAR

A piece of copper (5.00 g) is heated for 2.0 seconds, and 100. J of heat energy is transferred to the copper. The temperature increases from 20.0 °C to 71.9 °C. Calculate the specific heat capacity of copper.

- A. 0.278 J/g•K
- B. 0.385 J/g•K
- C. 1.93 J/g•K
- D. 2.60 J/g•K
- E. -0.977 J/g•K

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When 108 grams of water at 22.5 °C are mixed with 65.1 grams of water at an unknown temperature, the final temperature of the mixture is 47.9 °C. What was the initial temperature of the other sample of water?

- A. 8.9 °C
- B. 79.7 °C
- C. 67.0 °C
- D. 90.0 °C
- E. 274 °C

MAR

The standard molar enthalpy of combustion for propane is -2044 kilojoules.



What is the standard enthalpy change for the combustion of 3.000 mol of propane (C₃H₈)?

- A. -6132 kJ
- B. -2044 kJ
- C. -4088 kJ
- D. +2044 kJ
- E. +6132 kJ

MAR

Calculate the enthalpy for the reaction

$$\text{SiH}_4(\text{g}) + 2 \text{O}_2(\text{g}) \rightarrow \text{SiO}_2(\text{g}) + 2 \text{H}_2\text{O}(\text{g})$$

using these values:

$\Delta H_f^\circ[\text{SiH}_4(\text{g})] = +34.3 \text{ kJ/mol}$;
 $\Delta H_f^\circ[\text{SiO}_2(\text{g})] = -910.9 \text{ kJ/mol}$; and
 $\Delta H_f^\circ[\text{H}_2\text{O}(\text{g})] = -241.8 \text{ kJ/mol}$

- A. -1187.0 kJ/rxn
- B. -1428.8 kJ/rxn
- C. -1360.2 kJ/rxn
- D. -2218.7 kJ/rxn
- E. Not enough information

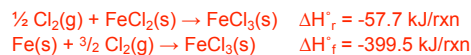
MAR

Which equation below defines the standard molar enthalpy of formation of gaseous methanol, CH₃OH?

- A. $\text{CH}_4(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{g})$
- B. $\text{C}(\text{s}) + 2 \text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{g})$
- C. $\text{CO}(\text{g}) + 2 \text{H}_2(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{g})$
- D. $\text{H}_2\text{O}(\text{g}) + \text{C}(\text{s}) + \text{H}_2(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{g})$
- E. You'll go blind if you drink methanol! Who cares! :)

MAR

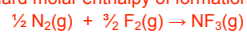
Calculate the standard molar enthalpy of formation for FeCl₂(s) using the following:



- A. -57.7 kJ/mol
- B. -341.8 kJ/mol
- C. -284.1 kJ/mol
- D. -457.2 kJ/mol
- E. 42 kJ/mol

MAR

Given the bond dissociation enthalpies below, calculate the standard molar enthalpy of formation of NF_3 :



Bond	Dissociation Enthalpy (kJ/mol)
$\text{N}\equiv\text{N}$	946
$\text{F}-\text{F}$	159
$\text{N}-\text{F}$	272

- A. 833 kJ/mol
- B. -105 kJ/mol
- C. 440. kJ/mol
- D. -578 kJ/mol
- E. -220. kJ/mol

MAR

**End of
Review -
good luck
with your
studying!**



Need more practice?

- *Practice Problem Sets (Companion and online)*
- *Concept Guides (Companion and online)*
- *Chapter Guides (online)*
- *End of Chapter Problems in Textbook (every other question has answer at end)*

Good luck with your studying!

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