

Chemistry 221 Final Exam Review
Chapter 6 and Chapter 7.1-7.2



Chemistry 221
Professor Michael Russell

MAR Last update:
4/27/26



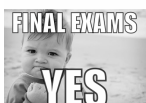
CH 221 Lecture & Lab Final Exams

Lecture Final:

- 24 multiple choice questions and four short answer questions, Chapters 1 - 7.2 Bring: **calculator**, pencil, **Lab Final**, "**Net Ionic Reactions**" lab

Lab Final: Due at time of Lecture Final

- 6 short answer questions over labs from this term; released Mon (L1-L3) or Wed (L4), turn in printed copy to receive credit



L1: Wed, Dec. 9, 8:45 AM, AC 1303
L2: Tues, Dec. 8, 8:30 AM, AC 2607
L3: Wed, Dec. 9, 1:10 PM, AC 2501
L4: Fri, Dec. 11, 1:10 PM, AC 2501

Check with instructor to ensure correct dates and times!



Final grades available by Friday night. Final exams not returned.

*Good luck with your studying!
Let's start the review!*

Which answer best represents the percent composition of the compound CO_2 ?

- A. 50.0% C & 50.0% O
- B. 12.0% C & 88.0% O
- C. 27.3% C & 72.7% O
- D. 12.0% C & 32.0% O
- E. 64.0% C & 36.0% O

MAR

Nitrogen and oxygen form a series of oxides with the general formula N_xO_y . One of them has 46.67% N. The empirical formula for this oxide is

- A. N_2O
- B. NO
- C. NO_2
- D. N_2O_3
- E. N_2O_5

MAR

Combining 6.54 g of Zn with oxygen gives a white powder, Zn_xO_y , with a mass of 8.14 g (all of the Zn reacts.) The empirical formula is:

- A. ZnO
- B. Zn_2O
- C. ZnO_2
- D. Zn_2O_3
- E. Zn_3O_4

MAR

Glyceraldehyde has an empirical formula of CH_2O and a molar mass is 90.08 g/mol. The **molecular formula** is:

- A. CH_2O
- B. $\text{C}_2\text{H}_4\text{O}_2$
- C. $\text{C}_3\text{H}_6\text{O}_3$
- D. $\text{C}_4\text{H}_8\text{O}_4$
- E. $\text{C}_4\text{H}_4\text{O}_4$

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A compound with P and F is 75.41% F with a molar mass of 251.94 g/mol. What is the molecular formula?

- A. P_2F_2
- B. $P_{10}F_2$
- C. PF_5
- D. P_2F_5
- E. P_2F_{10}

MAR

Assume you dissolve 6.73 g Na_2CO_3 in enough water to make 250. mL of solution. (Molar mass of $Na_2CO_3 = 106$ g/mol.) What is the concentration of the sodium carbonate?

- A. 26.9 M
- B. 0.0635 M
- C. 0.254 M
- D. 0.762 M
- E. 42 M

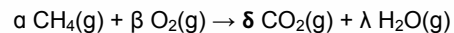
MAR

60.0 mL of 0.25 M HCl are added to a 500. mL volumetric flask; water is added to the mark on the flask. What is the concentration of HCl in the diluted solution?

- A. 0.015 M
- B. 0.025 M
- C. 0.030 M
- D. 0.060 M
- E. 0.050 M

MAR

Balance the following combustion reaction. What is the value of $\alpha + \beta + \delta + \lambda$?



- A. 4
- B. 6
- C. 8
- D. 10
- E. 16

MAR

What is the balanced equation for the combustion of butane, C_4H_{10} ?

- A. $C_4H_{10}(g) + O_2(g) \rightarrow CO_2(g) + H_2O(g)$
- B. $2 C_4H_{10}(g) + 13 O_2(g) \rightarrow 8 CO_2(g) + 10 H_2O(g)$
- C. $C_4H_{10}(g) + 13 O_2(g) \rightarrow 4 CO_2(g) + 5 H_2O(g)$
- D. $C_4H_{10}(g) + 9 O_2(g) \rightarrow 4 CO_2(g) + 10 H_2O(g)$
- E. $4 C_4H_{10}(g) + 26 O_2(g) \rightarrow 16 CO_2(g) + 20 H_2O(g)$

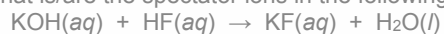
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Which of the following is the only insoluble salt in water?

- A. NH_4NO_3
- B. NaOH
- C. PbI_2
- D. K_2CO_3
- E. LiCl

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What is/are the spectator ions in the following reaction:



- A. K^+
- B. F^-
- C. K^+ and F^-
- D. H^+ and OH^-
- E. OH^-

MAR

Which equation below best represents the balanced, net ionic equation for the reaction of magnesium carbonate with nitric acid?

- A. $\text{MgCO}_3(s) + 2 \text{HNO}_3(aq) \rightarrow \text{Mg}(\text{NO}_3)_2(aq) + \text{CO}_2(g) + \text{H}_2\text{O}(l)$
- B. $\text{MgCO}_3(s) + 2 \text{H}^+(aq) \rightarrow \text{Mg}^{2+}(aq) + \text{CO}_2(g) + \text{H}_2\text{O}(l)$
- C. $\text{Mg}^{2+}(aq) + 2 \text{NO}_3^-(aq) \rightarrow \text{Mg}(\text{NO}_3)_2(s)$
- D. $\text{MgCO}_3(s) + 2 \text{HNO}_3(aq) \rightarrow \text{Mg}(\text{NO}_3)_2(aq) + \text{H}_2\text{CO}_3(aq)$
- E. More information is required to answer this question.

MAR

Which equation below best represents the balanced net ionic equation for the reaction of potassium hydroxide and iron(II) chloride to give iron(II) hydroxide and potassium chloride?

- A. $2 \text{KOH}(aq) + \text{FeCl}_2(aq) \rightarrow \text{Fe}(\text{OH})_2(s) + 2 \text{KCl}(aq)$
- B. $2 \text{KOH}(aq) + \text{FeCl}_2(aq) \rightarrow \text{Fe}(\text{OH})_2(aq) + 2 \text{KCl}(aq)$
- C. $2 \text{OH}^-(aq) + \text{Fe}^{2+}(aq) \rightarrow \text{Fe}(\text{OH})_2(s)$
- D. $\text{K}^+(aq) + \text{Cl}^-(aq) \rightarrow \text{KCl}(aq)$
- E. No reaction (all aqueous)

MAR

Which of the following statements is correct regarding the reaction of Zn with VO_2^+ ?



- A. Zn is oxidized and VO_2^+ is the reducing agent.
- B. Zn is reduced and VO_2^+ is the reducing agent.
- C. Zn is oxidized and VO_2^+ is the oxidizing agent.
- D. Zn is reduced and VO_2^+ is the oxidizing agent.
- E. This is not a redox reaction.

MAR

Which of the compounds below is *not* an acid in aqueous solution?

- A. $\text{CH}_3\text{CO}_2\text{H}$
- B. H_3PO_4
- C. NH_3
- D. HCl
- E. HClO_4

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Which compound below represents iodic acid?

- A. HI
- B. HIO
- C. HIO_2
- D. HIO_3
- E. HIO_4

MAR

How many of the following are strong bases?
NaOH, NH₃, HNO₃, KOH, water, LiOH, acetone

- A. none
- B. one
- C. two
- D. three
- E. four

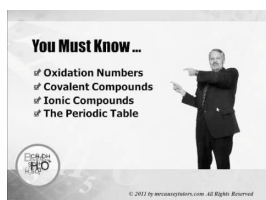
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How many of the following are strong acids?
HCl, NH₃, HNO₃, KOH, water, HBr, ethanol, HClO₄, HI

- A. one
- B. two
- C. three
- D. four
- E. five

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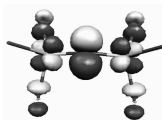
**End of
Review -
Good luck
with your
final exams!**



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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