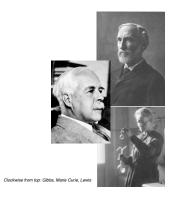
## Chemistry 223 Final Exam Review







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Which statement describes the composition of a neutral atom of iron-58?

- A. 26 neutrons, 32 protons, and 26 electrons
- B. 32 neutrons, 26 protons, and 26 electrons
- C. 26 neutrons, 26 protons, and 32 electrons
- D. 26 neutrons, 26 protons, and 26 electrons
- E. Not enough information

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

A. N<sub>2</sub>O

B. NO

 $\mathsf{C}.\mathsf{NO}_2$ 

 $D.N_2O_3$ 

 $E. N_2O_5$ 

Ammonia is prepared by the reaction:

 $N_2(g) + 3 H_2(g) \rightarrow 2 NH_3(g)$ 

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

A. 20.0 mol NH<sub>3</sub>

B. 16.7 mol NH<sub>3</sub>

C.37.5 mol NH<sub>3</sub>

D.25.0 mol NH<sub>3</sub>

E. 35.0 mol NH<sub>3</sub>

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Which of the compounds below would be the best conductor of electricity in aqueous solution?

A. CH<sub>3</sub>CO<sub>2</sub>H

B. H<sub>3</sub>PO<sub>4</sub>

C.NH<sub>3</sub>

D.HBr

E. HIO

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.  $2 \text{ KOH(aq)} + \text{FeCl}_2(\text{aq}) \rightarrow \text{Fe(OH)}_2(\text{s}) + 2 \text{ KCI(aq)}$ 

B.  $2 \text{ KOH(aq)} + \text{FeCl}_2 \text{ (aq)} \rightarrow \text{Fe(OH)}_2 \text{(aq)} + 2 \text{ KCl(aq)}$ 

C. 2 OH-(aq) + Fe<sup>2+</sup>(aq)  $\rightarrow$  Fe(OH)<sub>2</sub>(s)

 $D. \ K^{\scriptscriptstyle +}(aq) + Cl^{\scriptscriptstyle -}(aq) \to KCl(aq)$ 

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## Assume you dissolve 6.73 g Na<sub>2</sub>CO<sub>3</sub> in enough What is the oxidation number for Mn in KMnO<sub>4</sub>? 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. 0 B. +2 A. 26.9 M C.+4 B. 0.0635 M D.+7 C.0.254 M E.+8 D.0.762 M E.42 M MAR Calculate the enthalpy for the reaction $SiH_4(g) + 2 \ O_2(g) \rightarrow SiO_2(g) + 2 \ H_2O(g)$ The correct general valence electronic configuration for the alkali metals is: using these values: $\Delta H_{f}^{\circ}[SiH_{4}(g)] = +34.3 \text{ kJ/mol};$ A. ns1 $\Delta H_{f}^{\circ}[SiO_{2}(g)] = -910.9 \text{ kJ/mol}; \text{ and}$ B. ns<sup>2</sup> $\Delta H_{f}^{\circ}[H_{2}O(g)] = -241.8 \text{ kJ/mol}$ C.ns<sup>2</sup> np<sup>1</sup> D.ns<sup>2</sup> np<sup>5</sup> A. -1187.0 kJ/rxn B. -1428.8 kJ/rxn E. ns<sup>2</sup> np<sup>6</sup> C. -1360.2 kJ/rxn D. -2218.7 kJ/rxn E. Not enough information MAR Compare the elements Na, B, AI, and C with Compare the elements K, B, AI, and N with regard to the following properties: regard to the following properties: Which has the largest atomic radius? Which has the largest electronegativity? A. Na A.K B.B B.B C.Al C.Al D.C D.N E.Jq E. Jq

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Which of the following is NOT a correct Lewis dot structure?

A. N≡N

3c. H-c≡N

 $\mathbb{B}$ .  $|\mathbb{N} \equiv 0|^{\ominus}$ 

4D. C≡O

Determine the formal charges for the formate ion:

Formal charge = 
$$\begin{bmatrix} \vdots \\ \vdots \\ - \vdots \\ -$$

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Cysteine is one of the natural amino acids.

Estimate the values of the indicated angles:

A. Angle 1 = 180° Angle 2 = 120° Angle 3 = 109°

B. Angle 1 = 109° Angle 2 = 120° Angle 3 = 109°

C. Angle 1 = 109° Angle 2 = 109° Angle 3 = 109°

Which of the following could be an alkene?

 $A.\,C_nH_{2n+2}O$ 

 $B.C_nH_{2n+2}$ 

 $C.C_nH_{2n}$ 

 $D.C_nH_{2n-2}$ 

E. none of these

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

A. 894 mL

B. 463 mL

C.657 mL

D.359 mL

E.-155 mL

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

A. O<sub>2</sub> 32 g/mol

B. N<sub>2</sub> 28 g/mol

C.H<sub>2</sub> 2 g/mol

D.CO<sub>2</sub> 44 g/mol

E. Xe 131 g/mol

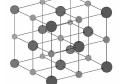
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Under what conditions will the ideal gas law be least effective?

- A. high temperature and high pressure
- B. high temperature and low pressure
- C.low temperature and high pressure
- D.low temperature and low pressure
- E. it works all the time

In the diagram for NaCl, the smaller blue atoms are Na and the larger green atoms are Cl. How many nearest neighbors of Cl does each Na have?

- A. 8
- B. 6
- C.4
- D.2 E.1



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Which water-based solution is expected to have the higher boiling point?

- A.0.10 molal NaCl
- B.0.15 molal sugar
- C.both the same
- D.not enough information

Erythritol occurs naturally in algae and fungi. A solution of 2.50 g of erythritol in 50.0 g of water freezes at -0.762 °C. What is the molar mass of the compound? ( $k_{fp}(H_2O)$  = -1.86 °C/m)

- A. 26.9 g/mol
- B. 35.5 g/mol
- C. 122 g/mol
- D. 224 g/mol
- E. 0.0100 g/mol

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Given the initial rate data for the reaction A + B  $\rightarrow$  C, determine the rate expression for the reaction.

[A] (M)	[B] (M)	$\Delta$ [C]/ $\Delta$ t (M/s)
0.10	0.20	40.
0.20	0.20	80.
0.10	0.10	40.

A.  $\Delta$ [C]/ $\Delta$ t = 2000[A][B]

 $\mathsf{B}.\,\Delta[\mathsf{C}]/\Delta t = 40.[\mathsf{A}]^2$ 

 $C.\Delta[C]/\Delta t = 4.0[B]$ 

 $D.\Delta[C]/\Delta t = 400[A]$ 

 $E.\Delta[C]/\Delta t = #1[AC/DC]$ 

Using the graph, determine the half life of this reaction.

A. 654 minutes B. 1308 minutes C. 1962 minutes D. 2616 minutes

E.0 minutes



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Radioactive iodine-131 is used to treat hyperthyroidism. It has a half-life of 8.04 days. If you begin with 8.8 micrograms, what mass remains after 32.3 days?

A. 4.4 micrograms

B. 2.2 micrograms

C. 1.1 micrograms

D. 0.54 micrograms

E. 0.23 micrograms

The reaction of  $NO_2(g)$  and CO(g) is thought to occur in two steps.

$$\begin{array}{lll} \textit{Step 1 Slow} & \mathsf{NO}_2(g) \ + \ \mathsf{NO}_2(g) \ \to \ \mathsf{NO}(g) \ + \ \mathsf{NO}_3(g) \\ \textit{Step 2 Fast} & \mathsf{NO}_3(g) \ + \ \mathsf{CO}(g) \ \to \ \mathsf{NO}_2(g) \ + \ \mathsf{CO}_2(g) \end{array}$$

Which species is acting as a catalyst in this mechanism?

A. NO<sub>2</sub>

B. NO

C. CO

D. CO<sub>2</sub>

E. NO<sub>3</sub>

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What is the unknown particle in the following nuclear reaction?

$$^{239}_{92}$$
U  $\rightarrow$  particle +  $^{239}_{93}$ Np

A. alpha

B. beta

C.gamma

D. neutron

E. positron

End of Review good luck with your studying!



Need more practice?

• Practice Problem Sets (online)

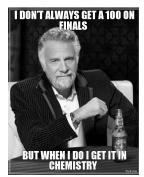
• Concept Guides (Companion and online)

• 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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