

Practice Exam 4

1. Of the elements N, P, As, Sb, and Bi, which one has the most metallic character?
 - a. N
 - b. P
 - c. As
 - d. Sb
 - e. Bi

2. Oxides of the alkaline earth family form
 - a. basic solutions.
 - b. acidic solutions.
 - c. gases with water.
 - d. noble gas compounds.
 - e. soluble sulfides.

3. Oxides of nitrogen are known which have the following positive oxidation numbers of nitrogen.
 - a. +2, +4
 - b. +2, +4, +6
 - c. +1, +3, +5
 - d. +2, +4, +5
 - e. +1, +2, +3, +4, +5

4. All of the following are acid-base conjugate pairs **EXCEPT**
 - a. H_3O^+ , OH^-
 - b. H_2O , OH^-
 - c. NH_4^+ , NH_3
 - d. CH_3COOH , CH_3COO^-
 - e. HPO_4^{2-} , PO_4^{3-}

5. Which of the following species is the best reducing agent?

- a. Cl_2
- b. F_2
- c. Na
- d. Br^-
- e. O^{2-}

6. All of the following would be expected to function as reducing agents **EXCEPT**

- a. H_2 .
- b. NH_3 .
- c. Sn^{2+} .
- d. Mg .
- e. Al^{3+} .

7.	<u>Half Reaction</u>	<u>E° (volts)</u>
	$\text{Br}_2 + 2e^- \rightarrow 2\text{Br}^-$	1.09
	$\text{Hg}_2^{2+} + 2e^- \rightarrow 2\text{Hg}$	0.80
	$\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu}$	0.34
	$2\text{H}^+ + 2e^- \rightarrow \text{H}_2$	0.00
	$\text{Sn}^{2+} + 2e^- \rightarrow \text{Sn}$	-0.14
	$\text{Fe}^{2+} + 2e^- \rightarrow \text{Fe}$	-0.41
	$\text{Al}^{3+} + 3e^- \rightarrow \text{Al}$	-1.67

The strongest reducing agent of this series is

- a. H_2
- b. Br_2
- c. Br^-
- d. Al
- e. Al^{3+}

8. An example of a neutral bidentate ligand is

- a. ammonia.
- b. oxalate ($\text{C}_2\text{O}_4^{2-}$).
- c. acetate.
- d. ethylenediamine.
- e. EDTA.

9. The name of the coordination compound with the formula $\text{Na}[\text{FeCl}_4]$ is

- a. sodium iron(III) tetrachloride.
- b. sodium tetrachloroferide(III).
- c. sodium chloroferrate(IV).
- d. sodium tetrachloroferrate(III).
- e. sodium ferroyltetrachloride.

10. The formula for the hydroxopentaaquairon(III) ion is

- a. $[\text{Fe}(\text{OH})(\text{H}_2\text{O})_5]^{3+}$
- b. $[\text{Fe}(\text{OH})(\text{H}_2\text{O})_5]^{2+}$.
- c. $[\text{Fe}(\text{OH})_5]^{3+}(\text{aq})$.
- d. $[(\text{H}_2\text{O})_5\text{Fe}](\text{OH})_3$.
- e. $[\text{Fe}^+{}_5 \text{H}_2\text{O}](\text{OH})_3$.

11. Which of the following can form optical isomers?

- a. CHCl_3
- b. CH_2Cl_2
- c. $(\text{CH}_3)(\text{CH}_2\text{CH}_3)_2\text{NH}^+$
- d. $\text{BrCH}(\text{CH}_3)\text{CO}_2\text{H}$
- e. $\text{CH}_2(\text{CO}_2\text{H})_2$

12. Which of the elements indicated below would be classed as transition elements?

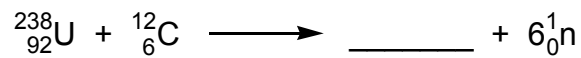
- a. $1s^2 2s^2 2p^5$
- b. $1s^2 2s^2 2p^6 3s^2 3p^6$
- c. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2 4s^2$
- d. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^1$
- e. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6$

13. How many unpaired electrons are there in the strong field complex, $[\text{Co}(\text{NH}_3)_6]^{3+}$?
- 0
 - 1
 - 2
 - 3
 - 5
14. Which of the following Lewis bases would be expected to form chelates with transition metal ions?
- $^-\text{OOC}^-\text{COO}^-$
 - $(\text{CH}_3)_2\text{NH}$
 - EDTA
- 1 only
 - 2 only
 - 3 only
 - 1 and 3 only
 - 1, 2, and 3
15. If a nucleus decays by successive α , β , β emissions, how would the atomic number and mass number change?
- The atomic number decreases by four; the mass number stays the same.
 - The atomic number increases by two; the mass number decreases by two units.
 - The atomic number stays the same; the mass number decreases by two units.
 - The atomic number decreases by two; the mass number decreases by four units.
 - The atomic number stays the same; the mass number decreases by four units.

16. The isotope ${}_{24}^{59}\text{Cr}$ is produced by the β decay of:

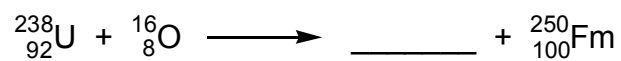
- a. ${}_{25}^{53}\text{Mn}$
- b. ${}_{24}^{54}\text{Cr}$
- c. ${}_{24}^{52}\text{Cr}$
- d. ${}_{23}^{53}\text{V}$
- e. ${}_{24}^{54}\text{V}$

17. Complete the following nuclear reaction:



- a. ${}_{99}^{249}\text{Es}$
- b. ${}_{98}^{239}\text{Cf}$
- c. ${}_{92}^{244}\text{U}$
- d. ${}_{98}^{244}\text{Cf}$
- e. ${}_{104}^{250}\text{Rf}$

18. What particles are produced in the following reaction?

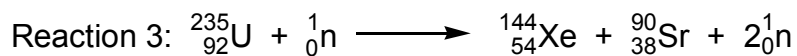
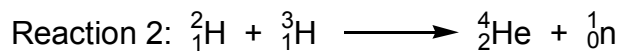
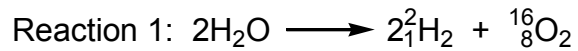


- a. 2 neutrons
- b. 4 neutrons
- c. 1 α particle
- d. 2 α particles
- e. 4 α particles

19. What do scientists call the sequence of rapidly occurring reactions that results when a nuclear fission reaction produces enough neutrons to produce more fission reactions?

- a. chain reaction
- b. nuclear fusion
- c. electron capture
- d. binding energy
- e. critical mass

20. Which of the following equations represent(s) a fusion reaction?



- a. Reaction 1
- b. Reaction 2
- c. Reaction 3
- d. Reaction 1 and 2
- e. Reaction 2 and 3