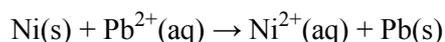


Placement Exam - Basic Principles of Chemistry Sample Questions

1. How many copper atoms are in a copper block with a mass of 3.10 g, given that copper has a molar mass of 63.55 g/mol?
 - a) 2.94×10^{22} Cu atoms
 - b) 5.88×10^{22} Cu atoms
 - c) 9.81×10^{22} Cu atoms
 - d) 2.11×10^{23} Cu atoms
2. An electron configuration for an atom shows the specific orbitals (s, p etc.) that electrons occupy for that atom. What is the electron configuration for Silicon, which has 14 electrons?
 - a) $1s^2 2s^2 2p^6 3s^2 3p^2$
 - b) $2s^1 2s^2 6p^2 2s^3 2p^3$
 - c) $1s^2 2s^2 2p^6 3s^2 3p^2$
 - d) None of the above
3. What is the equilibrium expression, K_c , for the reaction: $2S_{(s)} + 3O_{2(g)} \rightleftharpoons 2SO_{3(g)}$?
 - a) $[SO_3]^2/[O_2]^3$
 - b) $[SO_3]^2/[S]^2[O_2]^3$
 - c) $2[SO_3]/3[O_2]$
 - d) $2[SO_3]/(2[S]+3[O_2])$

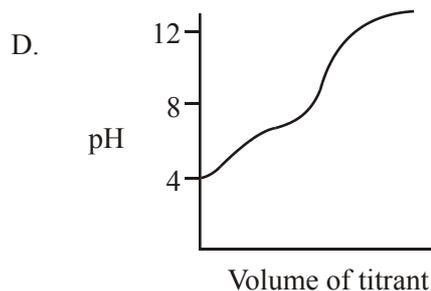
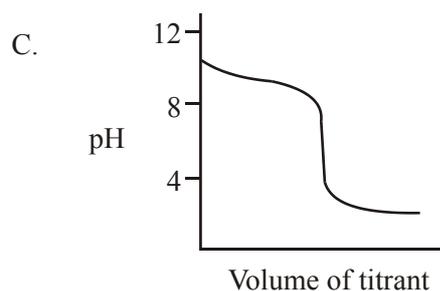
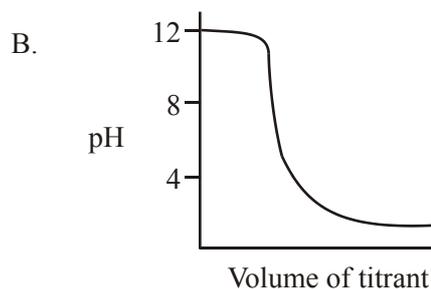
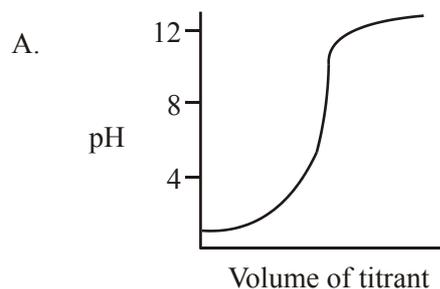
4. Why does the atomic radius of an atom decrease across a row in the periodic table?
- The electrons repel each other.
 - The nucleus decreases in size.
 - The electronegativity increases.
 - All of the above.
5. What is the molarity of Na^+ ions in a solution made by dissolving 4.20 g of NaHCO_3 ($M = 84.0$) and 12.6 g of Na_2CO_3 ($M = 126$) in water and diluting to 1.00 L?
- 0.250 M
 - 0.150 M
 - 0.100 M
 - 0.050 M
6. In which reaction at equilibrium will the amount of reactants present increase with an increase in the container volume?
- $\text{N}_{2(g)} + 3 \text{H}_{2(g)} \rightleftharpoons 2\text{NH}_{3(g)}$
 - $\text{CO}_{(g)} + \text{NO}_{2(g)} \rightleftharpoons \text{CO}_{2(g)} + \text{NO}_{(g)}$
 - $\text{H}_{2(g)} + \text{F}_{2(g)} \rightleftharpoons 2 \text{HF}_{(g)}$
 - $\text{C}_{(s)} + \text{CO}_{2(g)} \rightleftharpoons 2\text{CO}_{(g)}$

7. What occurs during the operation of a voltaic cell based on the following reaction?

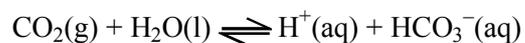


	External circuit	Ion movement in solution
a)	electrons move from Ni to Pb	$\text{Pb}^{2+}(aq)$ move away from Pb(s)
b)	electrons move from Ni to Pb	$\text{Pb}^{2+}(aq)$ move toward Pb(s)
c)	electrons move from Pb to Ni	$\text{Ni}^{2+}(aq)$ move away from Ni(s)
d)	electrons move from Pb to Ni	$\text{Ni}^{2+}(aq)$ move toward Ni(s)

8. Which curve is produced by the titration of a 0.1 mol dm^{-3} weak base with 0.1 mol dm^{-3} strong acid?



9. What will happen if $\text{CO}_2(\text{g})$ is allowed to escape from the following reaction mixture at equilibrium?



- a) The pH will decrease.
- b) The pH will increase.
- c) The pH will remain constant.
- d) The pH will become zero.

10. Which molecule is polar?

- a) CO_2
- b) PF_3
- c) CH_4
- d) BF_3

11. How many lone pairs and bonding pairs of electrons surround xenon in the XeF₄ molecule?

	Lone pairs	Bonding pairs
a)	4	8
b)	0	8
c)	0	4
d)	2	4

Basic Principles of Chemistry
Sample Questions

1. A
2. C
3. A
4. C
5. A
6. A
7. B
8. C
9. B
10. B
11. D