

California Chemistry Diagnostic Test Sample Questions

Competency areas: Compounds and elements; states of matter; reactions of matter; structure of matter; periodic properties; solutions; qualitative kinetics and thermodynamics; lab skills, mathematical skills. A Periodic Table is provided with the exam.

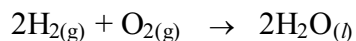
1. The correct formula for aluminum nitrate is

(a) Al_3N_2 (b) $\text{Al}_3(\text{NO}_3)$ (c) $\text{Al}(\text{NO}_2)_3$ (d) $\text{Al}(\text{NO}_3)_3$

2. A substance releases heat when it changes from

(a) liquid to solid
(b) solid to gas
(c) liquid to gas
(d) solid to liquid

3. Given the balanced equation:



How many grams of H_2O are formed if 9.00 mol $\text{H}_{2(\text{g})}$ reacts completely with an excess of $\text{O}_{2(\text{g})}$? The molar mass of H_2O is 18.0g/mol.

(a) 18.0g (b) 36.0g (c) 81.0g (d) 162g

4. Which element has exactly five electrons in the highest principal energy level (the outer shell)?

(a) Se (b) Ba (c) P (d) Ge

5. Which element is a metal?
- (a) Se (atomic number = 34)
 - (b) Co (atomic number = 27)
 - (c) C (atomic number = 6)
 - (d) Br (atomic number = 35)
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6. What volume of 1.5M NaOH is needed to provide 0.75 mol of NaOH?
- (a) 500L (b) 5.0 L (c) 500 mL (d) 0.75 L
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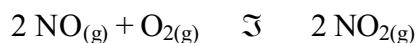
7. For a chemical reaction it is usually found that the reaction rate is faster at higher temperature. The rate increases because
- (a) the concentrations of reactants increase
 - (b) more reactants collide with energy equal to or greater than the activation energy
 - (c) the concentrations of products increase
 - (d) the volume expands and there is more room for new compounds (products) to form
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8. Which answer is closest to the true value of the expression:
- $(9.1 \times 10^4)(1.1 \times 10^{-5})(\log 10^{-13})(1000)$
- (a) 1.3 (b) 13000 (c) -13000 (d) 1.3×10^{-11}
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9. Which substance does not obey the Lewis octet rule?

- (a) N₂ (b) NO (c) CF₄ (d) Ar
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10. For the reaction at equilibrium:



which change will increase the amount of NO_{2(g)}?

- (a) remove NO gas
(b) add NO gas
(c) add a catalyst
(d) remove O₂ gas
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11. For the reaction



the expression for the equilibrium constant, K, is

- (a) $\frac{[\text{CO}_2][\text{H}_2\text{O}]}{[\text{C}_6\text{H}_6][\text{O}_2]}$
(b) $\frac{[\text{CO}_2]^2[\text{H}_2\text{O}]^6}{[\text{C}_6\text{H}_6]^2[\text{O}_2]^{15}}$
(c) $\frac{[\text{C}_6\text{H}_6][\text{O}_2]}{[\text{CO}_2][\text{H}_2\text{O}]}$
(d) $\frac{[12\text{CO}_2][6\text{H}_2\text{O}]}{[2\text{C}_6\text{H}_6][15\text{O}_2]}$
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answers: 1d; 2a; 3d; 4c; 5b; 6c; 7b; 8c; 9b; 10b; 11b