California Standards Test (CST) – Practice

1. Which element has properties most like those of magnesium?
   (a) calcium (b) potassium
   (c) cesium (d) sodium

2. Properties of nonmetal atoms include
   (a) low ionization energy and low electronegativity
   (b) low ionization energy and high electronegativity
   (c) high ionization energy and low electronegativity
   (d) high ionization energy and high electronegativity

3. If M represents an element in Group 2, the formula of its chloride would be
   (a) MCl (b) M_2Cl
   (c) MCl_2 (d) M_2Cl_2

4. When a potassium atom reacts with bromine, the potassium, atom will
   (a) lose only 1 electron
   (b) gain only 1 electron
   (c) lose 2 electrons
   (d) gain 2 electrons

5. Which pair of atoms will share electrons when a bond is formed between them?
   (a) Ba and I (b) K and CI
   (c) Br and CI (d) Li and I

6. When ionic bonds are formed, metallic atoms tend to
   (a) lose electrons and become negative ions
   (b) lose electrons and become positive ions
   (c) gain electrons and become negative ions
   (d) gain electrons and become positive ions

7. Which statement best describes the molecules of H_2O in the solid phase?
   (a) They move slowly in straight lines.
   (b) They move rapidly in straight lines.
   (c) They are arranged in a regular geometric pattern.
   (d) They are arranged in a random pattern.

8. Which electron dot symbol represents the atom in Period 4 with the highest first ionization energy?

   (a)  (b) 

   (c)  (d) 

9. Which electron-dot symbol represents an atom of chlorine in the ground state?

(a)  (b) 

(c)  (d) 

10. Given the unbalanced equation:

$$\_\_Na + \_\_H_2O \rightarrow \_\_H_2 + \_\_NaOH$$

When the equation is correctly balanced using the smallest whole-number coefficients, the coefficient for H_2O is:

(a) 1 (b) 2
(c) 3 (d) 4

11. Which equation is correctly balanced?

(a) $H_2 + O_2 \rightarrow H_2O$
(b) $Ca + Cl_2 \rightarrow CaCl$
(c) $2H_2 + O_2 \rightarrow 2H_2O$
(d) $Ca + Cl_2 \rightarrow Ca_2Cl$

13. The molar mass of propanal (C_2H_5CHO) is:

Atomic Molar Masses	
C	12.0 g·mol^{-1}
H	1.0 g·mol^{-1}
O	16.0 g·mol^{-1}

(a) 10 g·mol^{-1} (b) 29 g·mol^{-1}
(c) 42 g·mol^{-1} (d) 58 g·mol^{-1}

14. There are 6.02 x10^{23} water molecules in a mole of water. What is the mass, in grams, of 3.01 x 10^{23} molecules of water?

Atomic Molar Masses	
H	1.0 g·mol^{-1}
O	16.0 g·mol^{-1}

(a) 0.500 (b) 9.00
(c) 18.0 (d) 27.0

15. Consider this equation:

$$N_2 + 3H_2 \text{ ---> } 2NH_3$$

How many grams of ammonia, NH_3, will be prepared when 6.00 g of hydrogen, H_2, has reacted?

Atomic Molar Masses	
H	1.0 g·mol^{-1}
N	14.0 g·mol^{-1}

(a) 4.00 (b) 128.0
(c) 34.0 (d) 68.0

16. What is the maximum mass of water that can be produced from 34.0 g of ammonia?

$4NH_{3(g)} + 5O_{2(g)} \text{ ----> } 6H_2O_{(g)} + 4NO_{(g)}$

Atomic Molar Masses	
H	1.0 g·mol^{-1}
N	14.0 g·mol^{-1}
O	16.0 g·mol^{-1}

(a) 9.00 g (b) 18.0 g
(c) 36.0 g (d) 54.0 g

17. Which of the statements below are true about gases?
I. The mixing of gases is called diffusion.
II. Gases mix as a result of random molecular motion.
III. The faster gas molecules move, the more slowly they diffuse.

(a) I only (b) II only
(c) II and III (d) I and II

18. A real gas would behave most like an ideal gas under conditions of
(a) low pressure and low temperature
(b) low pressure and high temperature
(c) high pressure and low temperature
(d) high pressure and high temperature

20. A gas sample has a volume of 25.0 milliliters at a pressure of 1.00 atmosphere. If the volume increases to 50.0 milliliters and the temperature remains constant, the new pressure will be
(a) 0.250 atm (b) 0.500 atm
(c) 1.00 atm (d) 2.00 atm

21. When an acid is dissolved in water, it will
(a) release H^+ ions into the water.
(b) release H^- ions into the water.
(c) release OH^- ions into the water.
(d) not release ions into the water.

22. The ability of $H_2SO_{4\,(aq)}$ to change blue litmus red is mainly due to the presence of
(a) SO_2 molecules
(b) H_20 molecules
(c) $H_30^+_{(aq)}$ ions
(d) $SO_4{}^{2-}_{(aq)}$ ions

23.

pH Levels

$[H_3O^+]$	pH	Example
1×10^{0}	0	HCl (4%)
1×10^{-1}	1	Stomach acid
1×10^{-2}	2	Lemon juice
1×10^{-3}	3	Vinegar
1×10^{-4}	4	Soda
1×10^{-5}	5	Rainwater
1×10^{-6}	6	Milk
1×10^{-7}	7	Pure water
1×10^{-8}	8	Egg whites
1×10^{-9}	9	Baking soda
1×10^{-10}	10	Ammonia
1×10^{-11}	11	
1×10^{-12}	12	Drain cleaner
1×10^{-13}	13	NaOH (4%)
1×10^{-14}	14	

Which substance is the most basic?
(a) Egg whites
(b) Water
(c) Lemon juice
(d) Vinegar

24. A solution with a pH of 9 is -
(a) acidic
(b) basic
(c) neutral

25. Carbon dioxide gas is most soluble in water under conditions of :
(a) high pressure and low temperature
(b) high pressure and high temperature
(c) low pressure and low temperature
(d) low pressure and high temperature

26. The graph shows the solubility of certain solids in water as a function of temperature.
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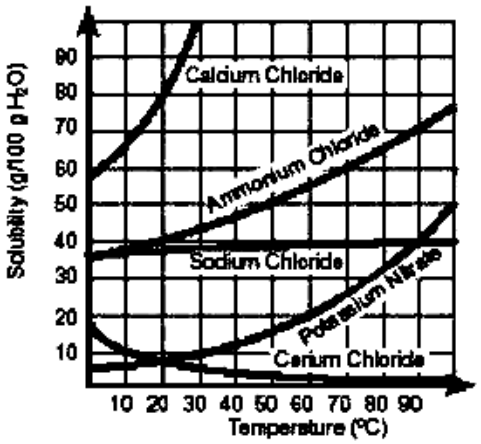
26. (continued)



Which solid's solubility in water is least affected by temperature?
(a) Calcium Chloride
(b) Ammonium Chloride
(c) Sodium Chloride
(d) Cerium Chloride

27. What is the concentration of a solution of 10. moles of copper (II) nitrate in 5.0 liters of solution?

(a) 0.05 M (b) 5.0 M
(c) 2.0 M (d) 10. M

28. A student observed that when sodium hydroxide was dissolved in water, the temperature of the water increased. The student should conclude that the dissolving of sodium hydroxide
(a) is endothermic
(b) is exothermic
(c) produces an acid solution
(d) produces a salt solution

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29. The heat of fusion of a compound is 30.0 calories per gram. What is the total number of calories of heat that must be absorbed by a 15.0 gram sample to change the compound from solid to liquid at its melting point?
(a) 15.0 cal (b) 150. cal
(c) 45.0 cal (d) 450. cal

30. The temperature of a sample of water changes from 10ºC to 20ºC when the water absorbs 100 calories of heat. What is the mass of the sample?
(a) 1 g (b) 10 g
(c) 100 g (d) 1000 g

31. Given the reaction:

$$Mg + 2H_2O \text{ <--> } Mg(OH)_2 + H_2$$

At which temperature will the reaction occur at the greatest rate?
(a) 25ºC (b) 50ºC
(c) 75ºC (d) 100ºC

32. Given the reaction:

$$Zn(s) + HCl(aq) \text{ ---> } ZnCl_2(aq) + H_2(g)$$

As the concentration of the HCL(aq) decreases at constant temperature, the rate of the reaction
(a) decreases
(b) increases
(c) remains the same

33. Adding a catalyst to a chemical reaction changes the rate of reaction by causing:
(a) a decrease in the activation energy
(b) an increase in the activation energy
(c) a decrease in the heat of reaction
(d) an increase in the heat of reaction

34. Given the reaction at equilibrium:

$$X + Y \text{ <---> } 2Z + \text{heat}$$

The concentration of the product could be increased by:
(a) adding a catalyst
(b) adding more heat to the system
(c) increasing the concentration of Y
(d) decreasing the concentration of x

35. Given the system at equilibrium:

$$H_2(g) + F_2(g) \text{ <--> } 2HF(g) + \text{heat}$$

Which change will *not* shift the point of equilibrium?
(a) changing the pressure
(b) changing the temperature
(c) changing the concentration of $H_2(g)$
(d) changing the concentration of HF(g)

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36. Which factors must be equal when a reversible chemical process reaches equilibrium? (a) mass of the reactants and mass of the products (b) rate of the forward reaction and rate of the reverse reaction (c) concentration of the reactants and concentration of the products (d) activation energy of the forward reaction and activation energy of the reverse reaction	THIS BOX INTENTIONALLY LEFT BLANK
37. What is the maximum number of covalent bonds that can be formed by one carbon atom? (a) 1 (b) 2 (c) 3 (d) 4	THIS BOX INTENTIONALLY LEFT BLANK
38. Organic compounds always contain the element (a) hydrogen (b) carbon (c) oxygen (d) sulfur	THIS BOX INTENTIONALLY LEFT BLANK
39. Which statement correctly describes what holds the nucleus together? (a) electrostatic attraction between protons (b) electrostatic attraction between protons and neutrons (c) gravitational forces between protons and neutrons (d) nuclear forces stronger than the repulsion between protons.	THIS BOX INTENTIONALLY LEFT BLANK
40. Which form of radioactive decay has *no* mass and *no* charge? (a) alpha (b) beta (c) gamma (d) neutron	THIS BOX INTENTIONALLY LEFT BLANK

Answers to Practice Test problems:

1. a
2. d
3. c
4. a
5. c
6. b
7. c
8. c
9. d
10. b
11. c
12. b
13. d
14. b
15. c
16. d
17. d
18. b
19. a
20. b
21. a
22. c
23. a
24. b
25. a
26. c
27. c
28. b
29. d
30. b
31. d
32. a
33. a
34. c
35. a
36. b
37. d
38. b
39. d
40. c