YUKON CHEMISTRY 12 (MCH--12) · FINAL EXAM · 50 QUESTIONS

Final Exam — Practice Test

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

1 **The rate of a reaction is best described as the**

- A change in concentration of a reactant or product per unit time
- B total mass of reactants used in the reaction
- C temperature at which the reaction starts
- D energy released when the reaction finishes

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2 **At equilibrium, the concentrations of reactants and products**

- A remain constant, though not necessarily equal
- B are always equal to each other
- C keep changing until the reaction stops
- D are always zero for the reactants

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3 **In a saturated solution with excess solid present, the solid is**

- A no longer dissolving at all
- B dissolving and precipitating at equal rates
- C only precipitating
- D only dissolving

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4 **Reduction is the process in which a species**

- A loses electrons
- B gains electrons
- C loses protons
- D gains neutrons

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5 **A powdered solid reacts faster than a single lump of the same solid because**

- **A** the powder has a larger surface area exposed to the other reactant
- **B** the powder has a lower activation energy
- **C** the lump has more total mass
- **D** the powder contains a catalyst

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6 **For $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$, the equilibrium expression is**

- **A** $K_eq = [CaO][CO_2]$
- **B** $K_eq = \frac{[CaO][CO_2]}{}$
- **C** $K_eq = [CO_2]$
- **D** $K_eq = \frac{1}{}$

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7 **The K_{sp} of AgCl is 1.8×10^{-10}. Its molar solubility, in mol/L, is about**

- **A** 1.8×10^{-10}
- **B** 3.6×10^{-10}
- **C** 9.0×10^{-11}
- **D** 1.3×10^{-5}

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8 **In a redox reaction, the oxidizing agent is the species that**

- **A** is oxidized and causes another species to be reduced
- **B** gains no electrons
- **C** is reduced and causes another species to be oxidized
- **D** loses no electrons

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9 **The activation energy of a reaction is the**

- **A** total energy released by the reaction
- **B** energy of the products alone
- **C** average kinetic energy of all particles
- **D** minimum energy colliding particles need to react

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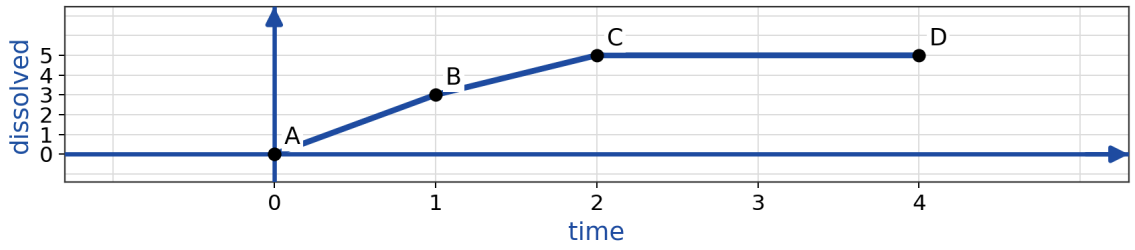
10 **At equilibrium, $[CO] = 0.20$, $[H_2O] = 0.20$, $[CO_2] = 0.40$, and $[H_2] = 0.40$, all in mol/L, for CO + $H_2O \rightleftharpoons CO_2 + H_2$.**
The value of K_eq is

- **A** 1
- **B** 2
- **C** 8
- **D** 4

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11

The graph shows the amount of solid dissolved against time. Points are (0, 0), (1, 3), (2, 5), and (4, 5). The flat section shows the solution has become



A dilute

B saturated

C unsaturated

D boiling

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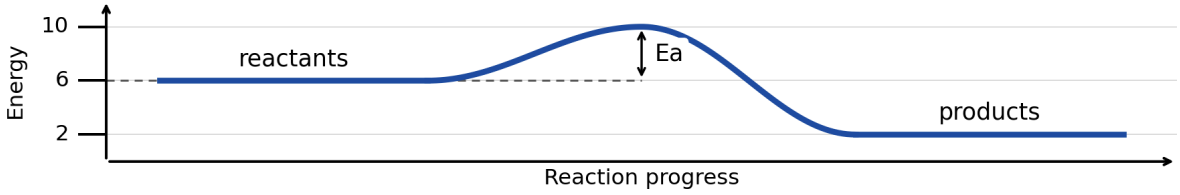
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12 **In a galvanic cell, reduction occurs at the**

- **A** anode
- **B** cathode
- **C** salt bridge
- **D** wire

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13 **The diagram shows the energy profile for a reaction. Reactants are at 6, the peak is at 10, and products are at 2. The activation energy, in the diagram units, is _____**



ANSWER _____

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14 For A ⇌ B, an ICE table starts with [A] = 1.00 mol/L and [B] = 0. At equilibrium [B] = 0.20 mol/L. The equilibrium concentration of A, in mol/L, is

- A 0.20
- B 0.40
- C 1.20
- D 0.80

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15 A solution with $[H_3O^+] = 1.0 \times 10^{-4}$ mol/L has a pH of

- A 2
- B 10
- C 4
- D 12

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16 **A galvanic cell converts**

A chemical energy into electrical energy

B electrical energy into chemical energy

C heat energy into light energy

D mechanical energy into heat

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17 **For the reaction A + B → products, the rate law is rate = k[A][B]. Doubling [A] only will**

A double the rate

B quadruple the rate

C halve the rate

D leave the rate unchanged

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18 For the system in the previous type of ICE problem, with $[H_2] = 0.20$, $[I_2] = 0.20$, and $[HI] = 0.60$, all in mol/L, K_eq is

- A 3
- B 6
- C 9
- D 15

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19 The pH of a 0.020 mol/L NaOH(aq) solution, to the nearest hundredth, is

- A 12.30
- B 11.30
- C 12.70
- D 13.30

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20 **Standard reduction potentials are measured relative to the**

- **A** standard zinc electrode
- **B** standard copper electrode
- **C** standard silver electrode
- **D** standard hydrogen electrode

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21 **A reaction is zero order with respect to B. Doubling [B] will**

- **A** leave the rate unchanged
- **B** double the rate
- **C** quadruple the rate
- **D** halve the rate

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22 **For $N_2 + 3H_2 \rightleftharpoons 2NH_3$ + heat, adding more N_2 at equilibrium will shift the equilibrium to the**

- **A** right, forming more NH_3
- **B** left, forming more N_2
- **C** right, forming more H_2
- **D** left, with no change in NH_3

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23 **A 0.10 mol/L solution of a weak acid, HX, has a pH of 3.00. The K_a of HX is approximately**

- **A** 1.0×10^{-3}
- **B** 1.0×10^{-7}
- **C** 1.0×10^{-2}
- **D** 1.0×10^{-5}

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24 **Given $E°(Mg^{2+}/Mg) = -2.37$ V and $E°(Ag^{+}/Ag) = +0.80$ V, the cell potential for $Mg + 2Ag^{+} \rightarrow Mg^{2+} + 2Ag$, in volts, is**

A 1.57

B 3.17

C 2.37

D 3.97

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25 **Two identical reactions are run, one with a catalyst and one without. The catalyzed reaction has a**

A higher activation energy and a larger enthalpy change

B lower activation energy and more product at equilibrium

C lower activation energy and the same enthalpy change

D higher activation energy and less product

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26 **For $N_2 + 3H_2 \rightleftharpoons 2NH_3$, increasing the pressure by decreasing volume will shift the equilibrium toward the side with**

A more moles of gas, the reactant side

B fewer moles of gas, the reactant side

C fewer moles of gas, the product side

D more moles of gas, the product side

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27 **For a conjugate acid-base pair, $K_a \times Kb$ equals**

A $Kw = 1.0 \times 10^{-7}$

B $Kw = 1.0 \times 10^{-14}$

C 14.00

D 7.00

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28 **In electroplating a spoon with silver, the spoon is the**

A anode

B salt bridge

C cathode

D power supply

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29 **As a reaction proceeds, its rate usually decreases because**

A the activation energy rises steadily

B the catalyst is consumed

C reactant concentrations fall, so collisions become less frequent

D the temperature always falls

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30 **Which change alters the value of K_eq for a reaction**

A a change in concentration

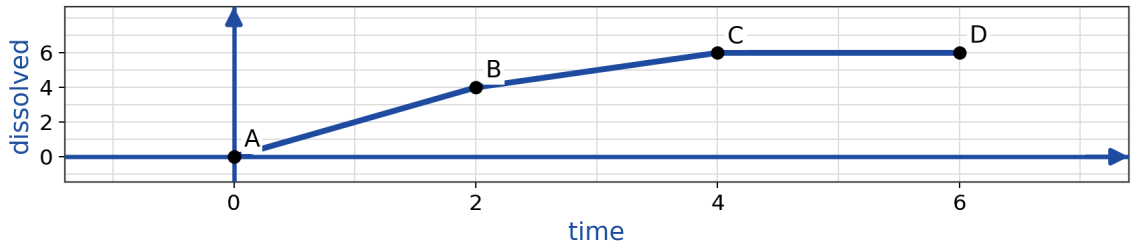
B a change in temperature

C a change in pressure

D adding a catalyst

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31 **The graph shows the mass of solid dissolved against time. Points are (0, 0), (2, 4), (4, 6), and (6, 6). The solution first becomes saturated at about**



A 2 minutes

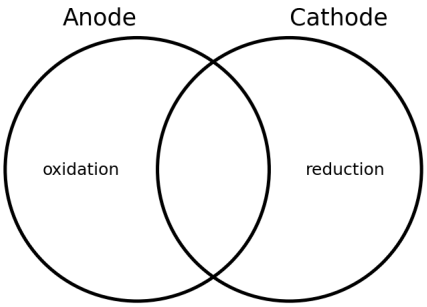
B 6 minutes

C 0 minutes

D 4 minutes

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32 **The diagram shows two sets: anodes and cathodes. Which statement belongs in the overlap of both sets**



A oxidation occurs there, where a substance loses electrons and its oxidation number rises

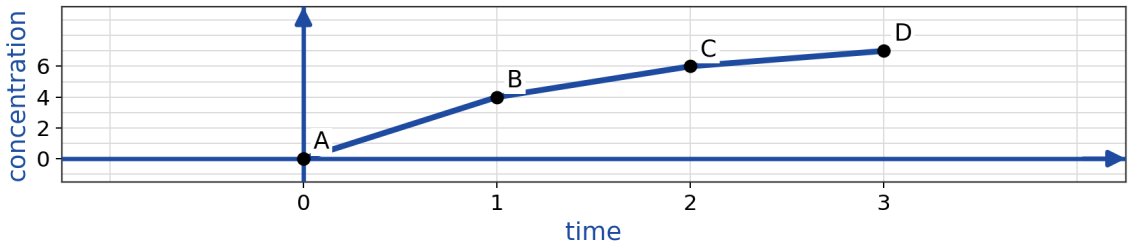
B reduction occurs there

C they are electrodes where a half-reaction occurs

D electrons leave there

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33 **The graph shows product concentration against time. Points are (0, 0), (1, 4), (2, 6), and (3, 7). During which time interval is product forming fastest**



A 1 to 2 minutes

B 0 to 1 minute

C 2 to 3 minutes

D The rate is constant

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34 **The equilibrium law expression for $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$ is**

- **A** $K_eq = \frac{[CO][H_2O]}{}$
- **B** $K_eq = \frac{[CO_2]}{}$
- **C** $K_eq = \frac{[CO_2][H_2]}{}$
- **D** $K_eq = [CO_2][H_2]$

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35 **A larger K_{sp} for salts of the same type generally means**

- **A** lower solubility
- **B** greater solubility
- **C** a higher pH
- **D** a lower temperature

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36 **In the reaction $Mg + 2Ag^{+} \rightarrow Mg^{2+} + 2Ag$, the oxidizing agent is**

A Mg

B Ag^{+}

C Mg^{2+}

D Ag

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37 **Which condition gives the fastest reaction between magnesium and acid**

A a magnesium block in cold, dilute acid

B magnesium ribbon in cold, dilute acid

C a magnesium block in warm, dilute acid

D magnesium ribbon in warm, concentrated acid

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38 **For X ⇌ Y, with [X] falling from 0.90 to 0.60 mol/L, and [Y] starting at 0, the equilibrium [Y], in mol/L, is**

A 0.10

B 0.60

C 0.90

D 0.30

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39 **A solution with pOH 3 has a pH of**

A 3

B 7

C 14

D 11

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40 **Given $E°(Mg^{2+}/Mg) = -2.37$ V and $E°(Zn^{2+}/Zn) = -0.76$ V, the cell potential for Mg + $Zn^{2+} \rightarrow Mg^{2+} + Zn$, in volts, is**

A 1.61

B 2.37

C 3.13

D 0.76

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41 **The concentration of a reactant falls from 0.60 mol/L to 0.30 mol/L in 15 seconds. The average rate of consumption, in mol/L/s, is**

A 0.020

B 0.010

C 0.030

D 0.040

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42 For $2SO_2 + O_2 \rightleftharpoons 2SO_3$, increasing the pressure will shift the equilibrium to the

- A left, toward more moles of gas
- B right, toward fewer moles of gas
- C right, toward more moles of gas
- D left, toward fewer moles of gas

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43 Which 0.10 mol/L solution has the highest pH

- A NaOH(aq)
- B HCl(aq)
- C NH_3(aq)
- D CH_3COOH(aq)

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44 **In a zinc-copper galvanic cell, the copper electrode**

A loses mass as copper metal is oxidized

B gains mass as copper metal plates onto it

C does not change in mass

D gains mass as zinc plates onto it

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45 **Which change increases both the frequency and the energy of collisions**

A adding a catalyst

B grinding a solid reactant

C diluting a solution

D raising the temperature

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46 **When a stress is applied to a system at equilibrium, the system shifts to**

- **A** increase the stress further
- **B** stop both reactions
- **C** partially counteract the stress
- **D** change the temperature to zero

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47 **The conjugate base of HF(aq) is**

- **A** $F^-(aq)$
- **B** $H_2F^+(aq)$
- **C** $H_3O^+(aq)$
- **D** $OH^-(aq)$

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48 **Which equation is a balanced redox half-reaction for the oxidation of aluminium**

- **A** $Al + 3e^- \rightarrow Al^{3+}$
- **B** $Al \rightarrow Al^{3+} + e^-$
- **C** $Al \rightarrow Al^{3+} + 3e^-$
- **D** $Al^{3+} + 3e^- \rightarrow Al$

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49 **Stirring a mixture can increase the reaction rate because**

- **A** it lowers the activation energy
- **B** it brings reactant particles into contact more often
- **C** it changes the enthalpy of reaction
- **D** it acts as a catalyst

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50

For A + B ⇌ C + D,
if [C] is 0.30, [D] is 0.30, [A] is 0.10, and [B] is 0.10, all in mol/L, K_eq is

A 3

B 6

C 12

D 9

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ANSWER KEY

1.	A	**18.**	C	**35.**	B
2.	A	**19.**	A	**36.**	B
3.	B	**20.**	D	**37.**	D
4.	B	**21.**	A	**38.**	D
5.	A	**22.**	A	**39.**	D
6.	C	**23.**	D	**40.**	A
7.	D	**24.**	B	**41.**	A
8.	C	**25.**	C	**42.**	B
9.	D	**26.**	C	**43.**	A
10.	D	**27.**	B	**44.**	B
11.	B	**28.**	C	**45.**	D
12.	B	**29.**	C	**46.**	C
13.	4	**30.**	B	**47.**	A
14.	D	**31.**	D	**48.**	C
15.	C	**32.**	C	**49.**	B
16.	A	**33.**	B	**50.**	D
17.	A	**34.**	C		

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