**Chemistry 30: Practice Test #2**

1. Numerical response. Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

Which of the following changes, when applied to the equilibrium system given, would cause an **increase** in the amount **of reactants** produced?

Record all correct answers in numerical order.

HSO4- (aq) + CO32- (aq) $\leftrightarrow $ SO42- (aq) + HCO3- (aq) + heat

1. Na2SO4 (aq) is added
2. Volume of reaction vessel is increased.
3. CO32- is removed
4. NaHSO4 is added
5. HCO3- (aq) is added
6. Given that the equilibrium constant will increase when the temperature of a system is increased**, identify the type of reaction** and if heat would be included as a **product or reactant**.
7. Exothermic, reactant
8. Endothermic, reactant
9. Exothermic, product
10. Endothermic, product
11. Numerical response. Left justify your answer in the boxes provided

|  |  |
| --- | --- |
|  |  |

From the following list, select the statement(s) that apply to a system at equilibrium

1. The rate of the forward reaction equals the rate of the reverse reaction
2. The percent reaction is $>99\%$
3. Pressure of the system must remain constant
4. Concentration of the products is equal to the concentration of the reactants
5. The system may be open or closed

*Use the following information to answer the next question.*

Ascorbic acid, H2C6H6O6 (aq), is commonly taken on a daily basis as the dietary supplement Vitamin C. It has been suggested that this acid helps fight the common cold. The equation below represents the Brønsted-Lowry reaction of ascorbic acid and water.

H2C6H6O6 (aq) + H2O (l) ↔ HC6H6O6- (aq) + H3O+ (aq)

1. Which of the following rows identifies the Brønsted-Lowry acids and a conjugate acid-base pair from the equation above?

|  |  |  |
| --- | --- | --- |
| A. | H2C6H6O6 (aq) and HC6H6O6- (aq) | H2O (l) and H3O+ (aq) |
| B. | H2C6H6O6 (aq) and HC6H6O6- (aq) | HC6H6O6- (aq) and H3O+ (aq) |
| C. | H2C6H6O6 (aq) and H3O+ (aq) | H2O (l) and H3O+ (aq) |
| D. | H2C6H6O6 (aq) and H3O+ (aq) | HC6H6O6- (aq) and H3O+ (aq) |

*Use the following equilibrium reaction to answer the next question.*

2 NO (g) + O2 (g) ↔ 2 NO2 (g) + heat

1. Increase volume
2. Decrease volume
3. Increase NO (g) concentration
4. Decrease NO (g) concentration
5. Increase NO2 (g) concentration
6. Decrease NO2 (g) concentration
7. Numerical response. Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

The stresses numbered above that will cause the equilibrium system to shift to the right are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.

1. Which of the following substances can act as a Brønsted-Lowry base?
2. CH3OH (aq)
3. HCOOH (aq)
4. NaNO3 (aq)
5. NaHCO3 (aq)
6. Use the following reaction to complete the statement below.

2 SO2 (g) + O2 (g) ↔ 2 SO3 (g) Ka = 2.4 $×10^{3}$

The equilibrium law expression for the equation above is \_\_\_\_i\_\_\_\_, and at equilibrium, the amount of products present is \_\_\_ii\_\_\_ the amount of reactants present.

|  |  |  |
| --- | --- | --- |
|  | i | ii |
| A. | $$K\_{a}=\frac{\left[SO\_{3}\right]^{2}}{\left[SO\_{2}\right]^{2}\left[O\_{2}\right]}$$ | Less than |
| B. | $$K\_{a}=\frac{\left[SO\_{3}\right]^{2}}{\left[SO\_{2}\right]^{2}\left[O\_{2}\right]}$$ | Greater than |
| C. | $$K\_{a}=\frac{\left[SO\_{2}\right]^{2}\left[O\_{2}\right]}{\left[SO\_{3}\right]^{2}}$$ | Less than |
| D. | $$K\_{a}=\frac{\left[SO\_{2}\right]^{2}\left[O\_{2}\right]}{\left[SO\_{3}\right]^{2}}$$ | Greater than |

1. The equilibrium expression for the following equilibrium equation is \_\_\_\_\_\_\_.

2R(g) + 6M(s) + L2(g) 🡨 🡪 2RM3L(g)

|  |  |
| --- | --- |
| a | Kc =  |
| b | Kc =  |
| c | Kc =  |
| d | Kc =  |

1. Numerical response. Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

 Consider the table of observations made when some Brønsted-Lowry acids and bases are reacted. For each reaction the students have noted whether the reaction **favours reactants** or **favours products**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | HR(aq) | HG(aq) | HW(aq) | HM(aq) |
| R-­(aq) | ------ | Reactants | Products | Reactants |
| G-(aq) | Products | ------- | Products | Products |
| W-(aq) | Reactants | Reactants | ------ | Reactants |
| M-(aq) | Products | Reactants | Products | ------ |

 Using the list of chemical reagents given below, rank the acids from **weakest to strongest**.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| M-(aq) | G-(aq) | HW(aq) | HM(aq) | W-(aq) | HG(aq) | R-­(aq) | HR(aq) |

1. **Numerical response**. Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

 Household bleach contains NaOCl(aq), a weak base, The ionization reaction for sodium hypochlorite is given below.

OCl-(aq) + H2O(l) 🡨 🡪 HOCl(aq) OH-(aq)

 If the pOH of a solution is 5.00, the [NaOCl(aq)] is a.b x 10-c] 

1. **Numerical response**. Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

The Kb for the nitrite ion (NO2-(aq) is expressed as a.b x 10-cd. The values for a, b, c, and d are \_\_\_, \_\_\_, \_\_\_, and \_\_\_

1. A buffer is an equilibrium mixture of a \_\_\_\_\_\_ acid or base with its \_\_\_\_\_\_\_ partner.

|  |  |  |
| --- | --- | --- |
| a | Strong  | Amphoteric |
| b | Strong  | Conjugate |
| c | Weak  | Amphoteric  |
| d | Weak  | Conjugate |

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. A bomb calorimeter is ideally suited for measuring the heat evolved during a combustion reaction. A sample of sucrose (C12H22O11(s)) in a bomb calorimeter causes the temperature of 345 mL of water to rise from 24.9 oC to 28.3 oC. The heat capacitiy of the calorimeter assembly is 4.90 . What is the experimental molar enthalpy of combustion of sucrose in  ?
	1. -16.7
	2. +16.7
	3. -19.6
	4. +19.6

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Ethyl benzoate is formed by the following reaction.

**Benzoic Acid + Ethanol 🡨 H+ 🡪 ethylbenzoate + water**

In the above reaction hydrogen ions are used as a catalyst. When a catalyst is used the activation energy of a reaction

* 1. Increases
	2. Decreases
	3. Stays the same
	4. Is eliminated
1. Predict the enthalpy change due to the combustion of 11.7 g of propane in a barbeque. The molar enthalpy of combustion of propane is -2043.9 kJ/mol
	1. +5.42 x 102 kJ
	2. -5.42 x 102 kJ
	3. +2.39 x 104 kJ
	4. -2.39 x 104 kJ

*Use the following diagram to answer the next* ***two questions***

100

PE

(kJ)

A + B

40

C + D

20

Progress of the Reaction

1. The energy barrier that must be overcome for the forward reaction to occur is called the \_\_\_i\_\_\_, and in the diagram above it has a value of \_\_\_ii\_\_\_.

The statement above is completed by the information in row

|  |  |  |
| --- | --- | --- |
|  | *i* | *ii* |
| A. | activation energy | 80 kJ |
| B. | activation energy | 60 kJ |
| C. | enthalpy change | 80 kJ |
| D. | enthalpy change | 60 kJ |

1. The reaction depicted in the diagram above is \_\_\_i\_\_\_ and the enthalpy change for the forward reaction is\_\_\_ii\_\_\_

|  |  |  |
| --- | --- | --- |
|  | i | ii |
| A. | Endothermic | 80 kJ |
| B. | Endothermic | 20 kJ |
| C. | Exothermic | -80 kJ |
| D. | Exothermic | -20 kJ |

*Use the following information to answer the following question*

The combustion of sucrose can be represented by the following reaction

C12H22O11(s) + 12 O2(g) 🡪 12 CO2 (g) + 11 H2O(g) ΔH = -5155.7 kJ

1. The combustion of sucrose can be carried out in a calorimeter. If 343 mg of sucrose is combusted in a calorimeter containing 1.00 L of water, predict the change in temperature of the Calorimetry assembly *(assume the calorimeter has the same specific heat capacity as water)*.
	1. An increase of 1.35 oC
	2. A decrease of 1.35 oC
	3. An increase of 1.23 oC
	4. A decrease of 1.23 oC
2. The combustion of octane is shown in the unbalanced reaction below

\_\_\_\_\_C8H18(l) + \_\_\_\_\_O2(g) 🡪 \_\_\_\_\_CO2(g) + \_\_\_\_\_H2O(g)

What is the enthalpy of reaction for the combustion of 1 mol of octane?

1. -385.2 kJ
2. -5225.8 kJ
3. -5074.1 kJ
4. -5470.1 kJ
5. *The products of cellular respiration are \_\_\_i\_\_\_, and the products of outdoor complete hydrocarbon combustion are \_\_\_ii\_\_\_*

The statement above is completed by the information in row.

|  |  |  |
| --- | --- | --- |
|  | *i* | *ii* |
| A.  | CO2(g) and H2O(l) | CO2(g) and H2O(g) |
| B.  | CO2(g) and H2O(l) | CO2(g) and H2O(l) |
| C.  | C6H12O6(s) and O2(g) | CO2(g) and H2O(g) |
| D.  | C6H12O6(s) and O2(g) | CO2(g) and H2O(l) |

1. **Numerical Response**

Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

The energy released when 0.250 mol of mercury (II) oxide (red) is formed from its elements is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kJ.

1. **Numerical Response**

Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

Use the given reactions to solve this question.

N2(g) + O2(g) 🡪 2 NO(g) ΔH = +180.5 kJ

2NO2 (g) 🡪 2 NO(g) + O2(g) ΔH =+114.1 kJ

Find the molar enthalpy of formation of Nitrogen dioxide,

N2(g) + 2 O2(g) 🡪 2NO2(g) ΔH = +/-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kJ.

1. **Numerical Response**

Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

**Type of Reaction**

1. Endothermic
2. Exothermic

Match the type of reaction numbered above with the reactions given below.

Photosynthesis \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*(Record in Column 1)*

Cellular Respiration \_\_\_\_\_\_\_\_\_\_\_\_\_\_ *(Record in Column 2)*

*Formation of CO2(g) \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Record in Column 3)*

*Decomposition of H2O(l ) \_\_\_\_\_\_\_\_\_\_\_\_\_ (Record in Column 4)*

1. A student drew the following structural diagram:

 CH3CH2

 CH3

The IUPAC name for the molecule is 1- i -3- ii .

|  |  |  |
| --- | --- | --- |
|  | i | ii |
| A | ethyl | methylcyclohexane |
| B | ethyl | methylhexane |
| C | methyl | ethylcyclohexane |
| D | methyl | ethylhexane |

*Use the names of organic compounds to answer the following question.*

|  |  |
| --- | --- |
| 1. heptane
2. cycloheptane
3. hept-3-ene
4. 2-methylhex-3-yne
 | 1. methylcyclohexane
2. ethylcyclopentane
3. 1-ethyl-2-methylcyclobutene
4. 2,2-dimethylbutane
 |

-

1. **Numerical Response**

Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

The four compounds which are structural isomers of the compound at left are \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_.

1. Difference in boiling points will separate chemicals in a process called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	1. catalytic cracking
	2. solvent extraction
	3. catalytic reforming
	4. fractional distillation
2. The change in boiling point of alkanes with increasing molar mass is primarily due to increasing
	1. London dispersion forces
	2. dipole–dipole forces
	3. covalent bonds
	4. hydrogen bonds

*Use the diagrams of organic compounds to answer the* ***next TWO questions.***

|  |  |
| --- | --- |
| 1 CH2CH3 CH3 | 2 H H H H – C – C – C – C = O  H H H OH |
| 3 H H H H OH H – C – C – C – C – C – H H H H H H | 4 H H H H H – C – C = C – C – C – H H H H H  |
| 5 H H H O H – C – C – C – C H H H H H O – C – C – H H H | 6 H H H H H H – C – C – C – C – C – H H H H H H |
| 7 H H Cl H H H – C – C – C – C – C – H H H H H H | 8 |

1. **Numerical Response**

Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

Identify the following types of compounds, in order:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| alcohol |  | ester |  | carboxylic acid |  | Cyclo alkene |

1. **Numerical Response**

Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

 Identify the following types of compounds, in order:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Aliphatic alkene halogenated alkane cyclo alkane aliphatic alkane

1. **Numerical Response**

Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |
| --- |
| Crude oil is a mixture of many different hydrocarbons, with a wide range of molar masses. To be useful, it must be further refined into specific products. Chemical PROCESSES which are important at a refinery include:1. catalytic cracking
2. combustion
3. elimination
4. esterification
5. fractional distillation
6. polymerization
7. reforming
8. substitution
 |

**Match the process with the description:**

|  |  |
| --- | --- |
| Use a catalyst to break large hydrocarbons into smaller molecules  |  |
| Use heat, pressure, and a catalyst to convert straight-chain alkanes into branched alkanes, cyclic alkanes, and aromatics. |  |
| An exothermic process that consumes hydrocarbons, but produces thermal energy to fuel other processes in the refinery |  |
| Separates crude oil into components based upon their boiling properties |  |

Record your **four digit** answer in the boxes above.

1. When 2-methylbut-2-ene reacts with hydrochloric acid, the product(s) will be:
2. 2-methyl-2-chlorobutane and 2-methyl-3-chlorobutane
3. 2-chloro-2-methylbutane and 3-chloro-2-methylbutane
4. 2-chorobut-2-ene and methane
5. 2-chloro-2-methylbutane and 1-chloro-2-methylbutane
6. Which one of the following statements best describes an elimination reaction?
7. Carbon atoms in the organic product are bonded to fewer atoms than the carbon atoms in the organic reactant.
8. A hydrogen atom or functional group is replaced with a different atom or functional group.
9. Atoms are added to a double or triple carbon–carbon bond.
10. Two molecules are combined and a small molecule, such as water, is produced as a second product.
11. Which of the following equations best shows the complete combustion of propane?
12. 2C2H6(g) + 7O2(g) ⇄ 4CO2(g) + 6H2O(g)
13. 2C2H6(g) + 5O2(g) ⇄ C(s) + 2CO(g) + CO2(g) + 6H2O(g)
14. 2C3H8(g) + 9O2(g) ⇄ 6CO2(g) + 6H2O(g)
15. C3H8(g) + 5O2(g) ⇄ 3CO2(g) + 4H2O(g)
16. Which of the following compounds could be formed in the addition reaction of pent-1-ene and bromine?

a) Br Br

 Br

b) Br

c)

 Br Br

d) Br

 Br

1. Which of the following equations represent a **disproportion reaction**?
2. Sn(s) + Br2(l) 🡪 SnBr2(s)
3. 2Na(s) + I2(s) 🡪 2NaI(s)
4. 2NH3(aq) + NaOCl(aq) 🡪 N2H4(aq) + NaCl(aq) + H2O(l)
5. Cl2(aq) + H2O(l) 🡪 HOCl(aq) + H+(aq) + Cl­-(aq)
6. Which of the following equations represents a spontaneous redox reaction?
7. 3 Cr2+(aq) 🡪 Cr(s) + 2Cr3+(aq)
8. 2 H+(aq) + Cu(s) 🡪 H2(g) + Cu2+(aq)
9. O2(g) + 2H2O(l)+ 4 Br\_(aq) 🡪 2Br2 (l) + 4 OH-(aq)
10. MnO4- (aq) + 8 H+(aq) + 5 Fe2+(aq) 🡪 5 Fe3+(aq) + Mn2+(aq) + 4H2O(l)
11. A 1964 Chevy is parked in the backyard waiting to be restored. Snow and rain have corroded the car for many years. Which of the following would be **the least effective** at preventing this corrosion?
12. Cover with paint
13. Cover with a tarp
14. Store in a dry environment
15. Run a mild electric current through

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Use the following information to answer the next question.*

A simple demonstration of a redox reaction involves placing a solid piece of copper wire in a silver nitrate solution. Within minutes the wire begins to look fuzzy or furry, as small silver crystals begin to form on the wire. Meanwhile, the originally clear silver nitrate solution begins to take on a pale bluish tint. Furthermore, if the crystals are shaken off of the wire we see that the wire partially disintegrated.

The overall equation for our demonstration is:

Cu(s) + 2AgNO3 (aq) → Cu(NO3)2 (aq) + 2 Ag(s)

1. What is the net ionic equation for the above equation?

A. Cu(S) + 2Ag+(aq) → Cu2+(aq) + 2Ag(s)

 B. Cu(s) + 2AgNO3 (aq) → Cu(NO3)2 (aq) + 2 Ag(s)

C. CuO(s) + 2H+­(aq) 🡪 Cu2+(aq) + H2O(l)

D. Cu2+(aq) + 2e- 🡪 Cu(s)

1. **Numerical Response**

Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

Determine the oxidation numbers of phosphorus in the various compounds given. Charge is not included.

 NaH2PO4 (aq) P4 (s) PCl3 (l) PO43- (s)

 Record in the Record in the Record in the Record in the

1st box 2nd box 3rd box 4th box

40 . Select the statement that applies **only** to electrolytic cells.

1. Oxidation occurs at the anode
2. Cations travel to the anode
3. The standard cell potential is negative
4. Electrons travel in the external circuit from the anode to the cathode

41. **Numerical Response**

Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

Balance the following reaction by oxidation numbers.

**A** Mn2+ + **B** BiO3- + **C** H+ -> **D** MnO4- + **E** Bi3+ + **F** H2O

Record the values of A, B, E and F in the four boxes above.

42. Some electrochemical cells require a salt bridge or porous cup to separate the two reactants. Other electrochemical cells do not require a salt bridge or porous cup.

The cells that do **not** require a salt bridge are i cells, because the reaction in these cells is \_\_\_\_\_\_ii\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| **Row** | i | ii |
| **A** | electrolytic | spontaneous |
| **B** | electrolytic | non-spontaneous |
| **C** | voltaic | spontaneous |
| **D** | voltaic | non-spontaneous |

*Use the following Voltaic Cell to answer the next* ***THREE questions.***

43.**Numerical response**

2

1

 e‑ flow e- flow

0.42 V

|  |  |
| --- | --- |
| Zn30.10  5ZnSO4(aq)6 | C0.10 4CuSO4(aq) |
|  |

Match the numbers in the diagram above with their appropriate labels given below.

Anode \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Record in the **first** column)

Cathode \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Record in the **second** column)

Anion Movement \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Record in the **third** column)

Cation Movement \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Record in the **forth** column)

44. As the cell operates, the observations at the cathode will be the \_\_\_\_\_\_\_\_

 a) Plating of a silver coloured metal to the electrode

 b) Appearance of a blue colour in the solution

 c) Plating of a reddish brown coloured metal at the electrode

 d) Appearance of bubbles

45. In this Voltaic cell, the anode is \_\_\_\_\_ and will take a \_\_\_\_\_\_ charge. The cathode is \_\_\_\_ and will take a \_\_\_\_\_\_\_\_ charge.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a | Zinc | Positive | Carbon | negative |
| b | Carbon | Positive | Zinc | negative |
| c | Zinc | Negative | Carbon | positive |
| d | carbon | Negative  | Zinc  | positive |

*Use the following information to answer the next* ***two questions****.*

Samples of iron ore (Fe2O3(s)) can be smelted into iron metal by reacting it with coke (C(s)) at high temperatures. Carbon dioxide gas is a waste product.

46. **Numerical Response**

 Left justify your answer in the boxes provided

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

The unbalanced chemical equation is:

**A** Fe2O3(s) +**B** C(s) ⇄ **C** Fe(s) + **D** CO2(g)

Record the values of the coefficients A, B, C and D in the boxes provided above.

47. In this reaction \_\_\_\_\_\_ undergoes oxidation making it the \_\_\_\_\_\_\_ agent. The oxidation number of this chemical entity goes from \_\_\_\_\_\_ to \_\_\_\_\_\_\_

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a | Iron ore | Reducing | 3 | 0 |
| b | Iron ore | Oxidizing  | 0 | 3 |
| c | Carbon | Oxidizing  | 4 | 0 |
| d | Carbon  | Reducing | 0 | 4 |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Answers:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1.(135) | 2. b | 3. (13) | 4. c | 5. (236) | 6. d | 7. b | 8. b | 9. (6483) | 10. (414) |
| 11.(1811) | 12. d | 13. a | 14. b | 15. b | 16. b | 17. d | 18. a | 19. c | 20. a |
| 21. (22.7) | 22. (66.4) | 23. (1221) | 24. a | 25. (2356) | 26.d | 27. a | 28. (3521) | 29. (4786) | 30. (1725) |
| 31. b | 32. a | 33. d | 34. b | 35. d | 36. d | 37. b | 38. a | 39. (5035) | 40. c |
| 41. (2557) | 42.b | 43. (3456) | 44. c | 45. c | 46. (2343) | 47. d |  |  |  |