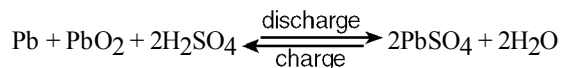


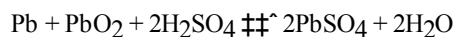
Name: _____

- 1) During discharge, which change in the oxidation state of lead occurs in the reaction $\text{Pb} + \text{PbO}_2 + 2\text{H}_2\text{SO}_4 \rightleftharpoons 2\text{PbSO}_4 + 2\text{H}_2\text{O}$?
- A) Pb^0 to Pb^{4+} B) Pb^{2+} to Pb^0 C) Pb^0 to Pb^{2+} D) Pb^{4+} to Pb^0
- 2) When a battery is in use, stored chemical energy is first changed to
- A) heat energy B) mechanical energy C) electrical energy D) light energy
- 3) The equation below represents the reaction for a lead-acid battery.



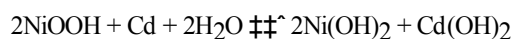
Which species is oxidized during the discharge of the battery?

- A) Pb B) H_2SO_4 C) PbO_2 D) PbSO_4
- 4) Which substance functions as the electrolyte in an automobile battery?
- A) H_2O B) H_2SO_4 C) PbO_2 D) PbSO_4
- 5) In a lead-acid battery, the concentration of the H_2SO_4 electrolyte solution
- A) decreases as the battery discharges C) increases as the battery discharges
B) remains the same as the battery discharges D) remains the same as the battery charges
- 6) Given the reaction in a lead storage battery:



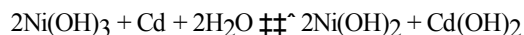
When the battery is being discharged, which change in the oxidation state of lead occurs?

- A) Pb^{4+} is reduced to Pb. C) Pb is oxidized to Pb^{4+} .
B) Pb is oxidized to Pb^{2+} . D) Pb^{2+} is reduced to Pb.
- 7) What kind of reaction occurs during the operation of a nickel-cadmium battery?
- A) an oxidation reaction, only C) a spontaneous redox reaction
B) a nonspontaneous redox reaction D) a reduction reaction, only
- 8) The equation below represents the reaction occurring in a nickel-cadmium battery.



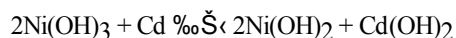
What reaction occurs at the cathode?

- A) oxidation of Cd C) reduction of NiOOH
B) oxidation of NiOOH D) reduction of Cd
- 9) Given the reaction for the nickel-cadmium battery:



Which species is oxidized during the discharge of the battery?

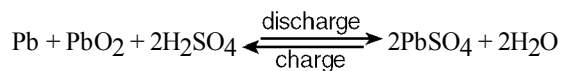
- A) Cd B) Cd^{2+} C) Ni^{2+} D) Ni^{3+}
- 10) A battery consists of what type of cells?
- A) electromagnetic B) electroplating C) electrochemical D) electrolytic
- 11) Given the probable reaction for the nickel-cadmium battery:



Which species is oxidized during the discharge of the battery?

- A) Ni^{2+} B) Cd^{2+} C) Ni^{3+} D) Cd^0

- 12) What is the negative electrode of a nickel oxide-cadmium battery?
 A) Cd(OH)_2 B) Ni C) Cd D) Ni(OH)_2
- 13) Which represents the positive electrode of a nickel-cadmium battery?
 A) Cd(OH)_2 B) Cd C) Ni D) Ni(OH)_3
- 14) Given the lead-acid battery reaction:



When the reaction produces electricity, which element changes oxidation states?

- A) O B) S C) Pb D) H
- 15) In a rechargeable battery system, the discharging reaction is
 A) endothermic and the charging reaction is exothermic
 B) endothermic and the charging reaction is endothermic
 C) exothermic and the charging reaction is endothermic
 D) exothermic and the charging reaction is exothermic
- 16) What type of reaction in a battery produces electrical energy?
 A) decomposition B) hydrolysis C) redox D) neutralization
- 17) The electricity produced by a battery results from
 A) neither an oxidation reaction nor a reduction reaction C) both an oxidation reaction and a reduction reaction
 B) an oxidation reaction, only D) a reduction reaction, only