Balance the following equation for an oxidation-reduction reaction occurring in an acidic solution:

$$MnO_4^-{}_{(aq)} + Fe^{2+}{}_{(aq)} \longrightarrow Mn^{2+}{}_{(aq)} + Fe^{3+}{}_{(aq)} \quad \text{(Acidic)}$$

The sum of the coefficients is:

A) 24 **B)** 20 **C)** 29 **D)** 18 **E)** 22

Balance the following equation for an oxidation-reduction reaction occurring in an acidic solution:

$$ClO_4^-{}_{(aq)} + SO_3^{2-}{}_{(aq)} \rightarrow SO_4^{2-}{}_{(aq)} + Cl^-{}_{(aq)} \quad \text{(Acidic)}$$

The sum of the coefficients is:

A) 6 **B)** 8 **C)** 12 **D)** 4 **E)** 10

Balance the following equation for an oxidation-reduction reaction occurring in a basic solution:

$$Br_2^0 + Mn^{2+} \rightarrow MnO_2 + Br^- \quad \text{(Basic solution)}$$

The sum of the coefficients is:

A) 15 **B)** 11 **C)** 12 **D)** 8 **E)** 17

1. Sort the elements according to their increasing ionization energy: $_{11}Na$, $_{19}K$, $_{9}F$, $_{12}Mg$, $_{10}Ne$

A) F < Mg < Ne < K < Na B) Na < K < F < Mg < Ne C) Ne < Na < Mg < F < K

D) K < Na < Mg < F < Ne E) Na < Mg < F < K < Ne

2. Arrange the following in order of increasing ionization energy: $_{3}Li$, $_{55}Cs$, $_{19}K$, $_{10}Ne$

A) K < Li < Cs < Ne B) Cs < K < Li < Ne C) Ne < K < Cs < Li

D) Li < Cs < K < Ne E) Cs < Ne < Li < K

3. List in order of increasing size of following atom and ions: $_{17}Cl^-$, $_{18}Ar$, $_{19}K^+$, $_{16}S^{2-}$, $_{20}Ca^{2+}$

A) $Cl^- < Ar < K^+ < S^{2-} < Ca^{2+}$ B) $K^+ < S^{2-} < Ar < Cl^- < Ca^{2+}$

C) $Ca^{2+} < K^+ < Ar < Cl^- < S^{2-}$ D) $S^{2-} < Cl^- < Ar < K^+ < Ca^{2+}$

E) $Ca^{2+} < S^{2-} < K^+ < Ar < Cl^-$

4. List in order of decreasing size of following atom and ions: $_{17}Cl^-$, $_{18}Ar$, $_{19}K^+$, $_{16}S^{2-}$, $_{20}Ca^{2+}$

A) $Cl^- > K^+ > Ar > S^{2-} > Ca^{2+}$ B) $Ca^{2+} > Ar > S^{2-} > K^+ > Cl^-$

C) $Ca^{2+} > K^+ > Ar > Cl^- > S^{2-}$ D) $S^{2-} > Cl^- > Ar > K^+ > Ca^{2+}$

E) $Ar > K^+ > S^{2-} > Cl^- > Ca^{2+}$

1. Which of the following is <u>true</u> in a periodic table?

I) Ionization energy increases from right to left.
II) Atomic radius increases from bottom to top.
III) Metallic character decreases from left to right.
IV) Atomic radius decreases from left to right.
V) Anion radii are larger than neutral.

A) I and II B) Only III C) III and IV D) IV and V E) III, IV and V

2. Which of the following is <u>not true</u> in a periodic table?

I) Ionization energy increases from right to left.
II) Atomic radius increases from top to bottom.
III) Metallic character increases from left to right.
IV) Atomic radius decreases from left to right.
V) Cation radii are larger than neutral.

A) I and III B) I, III and V C) III and IV D) I and II E) I, II and III

3. On the periodic table; which of the following specialties will decrease as you move left to right in a period?

I) Atomic radius
II) Electron Affinity
III) Electronegativity
IV) Atomic Number

A) Only I B) I and II C) I and III D) II and III E) II and IV

4. Which of the following is <u>true</u> in a periodic table?

I) Atomic size increases from left to right.
II) Electronegativity increases from bottom to top.
III) Ionization energy increases from left to right.

IV) Atomic radius decreases from left to right.
V) Cation radii are larger than neutral.

A) I, II and III B) I, III and V C) II,III and IV D) IV and V E) III, IV and V

1- In the reaction $2\ Na + 2\ H_2O \rightarrow 2\ NaOH + H_2$, how many liters of hydrogen at STP are produced from 50.0 grams of sodium? (Na = 23.0 g/mole, O = 16.0 g/mole, H = 1.0 g/mole)

A) (50.0/ 23.0). (22.4/ 2)
B) (50.0/ 23.0). (2). (22.4)
C) (50.0/ 23,0). (22.4)
D) (55.0/ 18.0). (22.4)
E) None of these

2- In the reaction $Fe_2O_3 + 3\ H_2 \rightarrow 2\ Fe + 3\ H_2O$, how many moles of iron can be produced using 17.4 liters of hydrogen at STP?

A) (17.4/22.4)(3/2)
B) (17.4/22.4)(2/3)
C) (17.4/22.4)
D) (17.4)(2/3)
E) none of these

1- What is the percent yield if 185 grams of SiO_2 are made from 328 g of Cr_2O_3 by the following equation? (SiO_2 : 60 g/mol, Cr_2O_3:152 g/mol)

$$3\ Si(s) + 2\ Cr_2O_3(s) \rightarrow 3\ SiO_2(s) + 4\ Cr(l)$$

A)95%
B)105%
C)56%

D)142%

E)70%

2- What is the percent yield if 122 grams of SiO_2 are made from 246 g of Cr_2O_3 by the following equation? (SiO_2 : 60 g/mol, Cr_2O_3:152 g/mol)

$$3\ Si(s) + 2\ Cr_2O_3(s) \rightarrow 3\ SiO_2(s) + 4\ Cr(l)$$

A) 59.3%

B)125%

C) 83.6%

D)49.6%

E)33.1%