1. A 1.0 L flask contains a mixture of hydrogen (8.0 atm), oxygen (4.0 atm) and neon (2.0 atm) at the stated partial pressures at a temperature of 40 °C. What is the total pressure inside the flask at 40 °C after the mixture is sparked. Ignore the vapour pressure of water.
   a) 14.0 atm  b) 10.0 atm  c) 6.0 atm  d) 2.0 atm  e) 0.0 atm

2. Assuming ideal behaviour, what is the boiling point of a solution of sodium hydroxide (150.0 g) in water (900.0 g)? The boiling point elevation constant, $K_b$, for water is 0.51 K kg mol$^{-1}$.
   a) 106.38 °C  b) 104.25 °C  c) 102.13 °C  d) 97.88 °C  e) 95.75 °C

3. Which one of the following is not an example of a conjugate acid-base pair?
   a) NH$_4^+$, NH$_3$
   b) HI, I$^-$
   c) CH$_3$CH$_2$OH$_2^+$, CH$_3$CH$_2$O$^-$
   d) HSO$_3^-$, SO$_3^{2-}$
   e) H$_2$O, OH$^-$

4. Which one of the following sets of 0.1 M solutions is arranged in order of increasing boiling point?
   a) glucose < NaCl < NH$_3$ < Na$_2$SO$_4$
   b) glucose < HBr < Na$_3$PO$_4$ < Na$_2$SO$_4$
   c) Na$_2$SO$_4$ < Na$_3$PO$_4$ < HBr < glucose
   d) glucose < HBr < Na$_2$SO$_4$ < Na$_3$PO$_4$
   e) HBr < Na$_2$SO$_4$ < Na$_3$PO$_4$ < glucose

5. What is the pH of a 0.20 M solution of boric acid? The $pK_a$ of boric acid is 9.24.
   a) 0.70  b) 2.73  c) 4.97  d) 5.12  e) 5.87
6. What is the pH of a 0.045 M solution of KOBr? The \( pK_a \) of HOBr is 8.63.
   a) 4.74  b) 4.99  c) 8.25  d) 9.01  e) 10.64

7. A buffered solution is 0.0500 M CH\(_3\)COOH and 0.0400 M NaCH\(_3\)CO\(_2\). If 0.0100 mol of gaseous HCl is added to 1.00 L of the buffered solution, what is the final pH of the solution? For acetic acid, \( pK_a = 4.76 \)
   a) 4.76  b) 4.46  c) 4.66  d) 4.86  e) 4.54

8. In each of the following titrations, the first solution is in the burette and the second solution is in the titration flask. For which titration would the curve illustrated be typical?
   ![Graph]
   a) Na\(_2\)CO\(_3\) (0.05 M) / HCl (0.1 M)
   b) NaOH (0.1 M) / HI (0.1 M)
   c) NaOH (0.1 M) / CH\(_3\)COOH (0.1 M)
   d) NH\(_3\) (0.1 M) / CH\(_3\)COOH (0.1 M)
   e) NH\(_3\) (0.1 M) / HCl (0.1 M)

9. What is the electronic configuration of Mn\(^{4+}\)?
   a) \( 1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 4s^2 \ 3d^1 \)
   b) \( 1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 4s^1 \ 3d^2 \)
   c) \( 1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 3d^3 \)
   d) \( 1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 3d^5 \)
   e) \( 1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 4s^2 \ 3d^6 \)

10. What is the systematic name for the coordination compound, [Mo(NH\(_3\)\(_3\))(OH\(_2\))\(_3\)]Cl\(_3\)?
   a) triaquatriamminemolybdenum(VI) trichloride
   b) triaquatriamminemolybdenum(III) trichloride
   c) triamminetriaquamolybdenum(III) trichloride
   d) triaquatriamminemolybdenum(III) chloride
   e) triamminetriaquamolybdenum(III) chloride

Correct answers: 1D, 2B, 3C, 4D, 5C, 6E, 7B, 8B, 9C, 10E