Questions 1 – 9 refers to the following problem

When 57.5 grams of copper(I) sulfate reacts with potassium iodide, how much of each product is produced?

1) What is the formula for copper(I) sulfate?
   (a) CuS
   (b) $CuSO_3$
   (c) Cu_2SO_4
   (d) Cu_4SO

2) What is the formula for potassium iodide?
   (a) IK
   (b) PI
   (c) KI
   (d) KIo

3) What type of reaction is this?
   (a) combination
   (b) single replacement
   (c) double replacement
   (d) decomposition

4) When the equation is correctly balanced, what is the sum of the coefficients?
   (a) 4
   (b) 5
   (c) 6
   (d) 12

5) The correct formula for one of the products is
   (a) KSO_4
   (b) K_4SO
   (c) K_2SO_4
   (d) SO_4K_2

6) The correct formula for one of the products is
   (a) CuI
   (b) Cu_2I
   (c) ICu_2
   (d) I_2SO_4

7) The amount of one of the products produced is
   (a) 132 grams
   (b) 100. grams
   (c) 61.0 grams
   (d) 98.2 grams

8) The amount of the other product is
(a) 166.16 grams
(b) 174.26 grams
(c) 60.3 grams
(d) 44.9 grams

9) The amount of potassium iodide that is consumed by the 57.5 grams of copper(I) sulfate is
(a) 166.16 grams
(b) 174.26 grams
(c) 166.11 grams
(d) 88.5 grams

Problems 10 → 14 deals with 527 grams of zinc phosphate

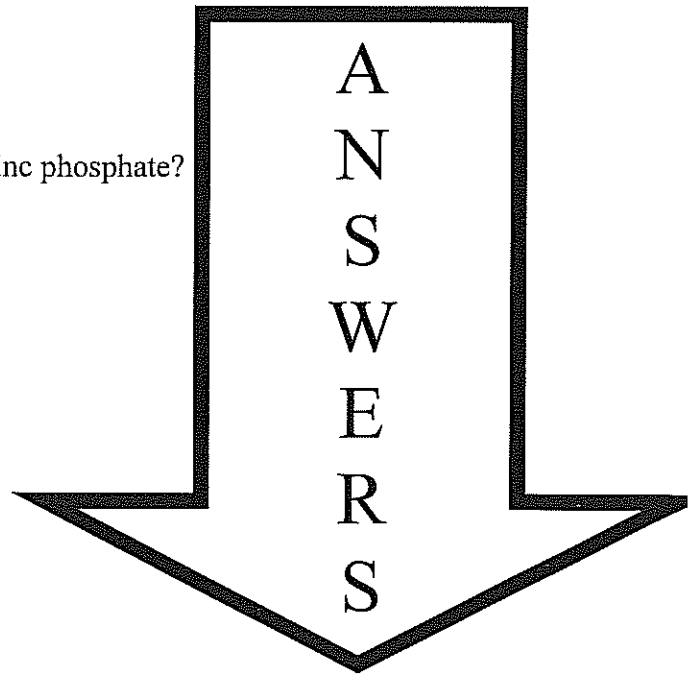
10) What is the formula of zinc phosphate
(a) ZnP
(b) Zn4(PO2)3
(c) Zn3(PO2)4
(d) Zn3(PO4)2

11) What is the molar mass of zinc phosphate?
(a) 196.17 grams
(b) 112.36 grams
(c) 386.11 grams
(d) 355.14 grams

12) What is the number of moles of zinc phosphate in this sample?
(a) 0.733 moles
(b) 1.36 moles
(c) 11805 moles
(d) 3.17×10^{26} moles

13) How many grams of O are in the sample of zinc phosphate?
(a) 84.5 grams
(b) 174.70 grams
(c) 267.77 grams
(d) 84500 grams

14) How many atoms of O does this represent?
(a) 6.02×10^{23}
(b) 1.64×10^{23}
(c) 61.1
(d) 6.57×10^{24}



① Copper (I) sulfate

$Cu^+ + SO_4^{2-} \rightarrow \boxed{Cu_2SO_4}$

② Potassium iodide

$K^+ + I^- \rightarrow \boxed{KI}$

③ $Cu_2SO_4 + KI \rightarrow \underbrace{CuI}_{Cu^+ \& I^-} + \underbrace{K_2SO_4}_{K^+ + SO_4^{2-}}$

Double replacement

④ $Cu_2SO_4 + 2KI \rightarrow 2CuI + K_2SO_4$

Total is $1 + 2 + 2 + 1 = \boxed{6}$

⑤ C

⑥ A

⑦ → ⑨ $Cu_2SO_4 + 2KI \rightarrow 2CuI + K_2SO_4$

57.5 g → #9 ? g → ? g → ? g

$57.5\,g\ Cu_2SO_4 \times \frac{1\,mol\ Cu_2SO_4}{223.17\,g\ Cu_2SO_4} \times \frac{2\,mol\ CuI}{1\,mol\ Cu_2SO_4} \times \frac{190.46\,g\ CuI}{1\,mol\ CuI}$

$= \boxed{98.2\,g\ CuI}$

$57.5\,g\ Cu_2SO_4 \times \frac{1\,mol\ Cu_2SO_4}{223.17\,g\ Cu_2SO_4} \times \frac{1\,mol\ K_2SO_4}{1\,mol\ Cu_2SO_4} \times \frac{174.26\,g\ K_2SO_4}{1\,mol\ K_2SO_4}$

$= \boxed{44.9\,g\ K_2SO_4}$

$57.5\,g\ Cu_2SO_4 \times \frac{1\,mol\ Cu_2SO_4}{223.17\,g\ Cu_2SO_4} \times \frac{2\,mol\ KI}{1\,mol\ Cu_2SO_4} \times \frac{166.00\,g\ KI}{1\,mol\ KI}$

$= \boxed{85.5\,g}$

-OR-

⑨ Law of Conservation of mass

$(98.1\ g + 44.9\ g) = 57.5\ g\ Cu_2SO_4 + x\ g\ KI$

$= 85.5\ g\ KI$

⑩ $Zn^{2+} + PO_4^{3-} \rightarrow Zn_3(PO_4)_2$

⑪ $Zn = 3 \times 65.39 = 196.17$
$P = 2 \times 30.97 = 61.94$
$O = 8 \times 16 = 128$
386.11

⑫ $527\ g\ Zn_3(PO_4)_2 \times \frac{1\ mol\ Zn_3(PO_4)_2}{386.11\ g\ Zn_3(PO_4)_2} = 1.36\ mol$

⑬ $1.36\ mol\ Zn_3(PO_4)_2 \times \frac{8\ mol\ O}{1\ mol\ Zn_3(PO_4)_2} \times \frac{16\ g\ O}{1\ mol\ O} =$

$174.70\ grams\ O$

⑭ $174.70\ g\ O \times \frac{1\ mol\ O}{16\ g\ O} \times \frac{6.02 \times 10^{23}\ atoms\ O}{1\ mol\ O} = 6.57 \times 10^{24}$

Answer #13 ↗

-or-

$1.36\ mol\ Zn_3(PO_4)_2 \times \frac{8\ mol\ O}{1\ mol\ Zn_3(PO_4)_2} \times \frac{6.02 \times 10^{23}\ atoms\ O}{1\ mol\ O}$

answer #12 ↗

$= 6.55 \times 10^{24}$