

# Chemical Reactions Regents Exam Problems Answer Key

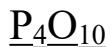
#	Answer	Think
1	3	$14.58 \text{ g Mg}_{(\text{S})} + 5.60 \text{ g N}_{2(\text{G})} \rightarrow 20.18 \text{ g Mg}_3\text{N}_{2(\text{S})}$ Law of conservation of matter math, mass of reactants = mass of products
2	3	Go slowly through the word equations while looking at table F (solubility guidelines for aqueous solutions). Silver Chloride is insoluble or SOLID in water. $\text{AgCl}(\text{S})$ not Aq!
3	3	This is single replacement. Here, the F replaces the Cl (an anion replacement)
4	2	Bonds form and energy is released. (memorize that line)
5	4	Equation must be balanced and the energy must be on the correct side of the equation, this is clearly exothermic, top line of table I.
6	3	$\text{Cr}^{+3}$ and $\text{O}^{-2}$ criss cross to make a neutral ionic compound.
7	4	Balanced equation works
8	2	$24.51 \text{ g KClO}_3 + \text{energy} \rightarrow \underline{\text{X grams}} \text{ KCl} + 9.60 \text{ g O}_2$ Law of conservation of matter math, mass of reactants = mass of products
9	3	This is synthesis or they might trick you because it is also a combination reaction.
10	1	$1 \text{ gram H}_{2(\text{G})} + 15 \text{ grams NO}_{(\text{G})} \rightarrow \underline{\text{X grams}} \text{ N}_{2(\text{G})} + 9 \text{ grams H}_2\text{O}_{(\text{G})}$ Law of conservation of matter math, mass of reactants = mass of products

11.  $\text{H}_2\text{B}_4\text{O}_{7(\text{S})}$  is the tetraboric acid formula. An empirical formula is a “ratio” of atoms:atoms represented in the most reduced form. This formula has a 2:4:7 ratio, and that cannot be reduced to a simpler ratio.

12.  $\text{P}_4\text{O}_{10(\text{S})} + 6\text{H}_2\text{O}_{(\text{G})} \rightarrow 4\text{H}_3\text{PO}_{4(\text{AQ})} + \text{energy}$  is balanced.  
A number “1” is allowed too, like this:  $1 \text{P}_4\text{O}_{10(\text{S})} + 6\text{H}_2\text{O}_{(\text{G})} \rightarrow 4\text{H}_3\text{PO}_{4(\text{AQ})} + \text{energy}$

14. The solid reactant is the phosphorous decoxide, and its empirical formula would be:  $\text{P}_2\text{O}_5$

15. The percent comp by mass of phosphorus in  $\text{P}_4\text{O}_{10}$  requires you to calculate the molar mass, then use it to calculate the percent comp. This sums to 100% (good). If you rounded your math to 44%, and 56%, an answer of 44% is also correct.



$$\text{P} \quad 4 \times 31 = 124 \text{ g}$$



$$\text{P} \quad (124/284) \times 100\% = 43.7\%$$

$$\text{O} \quad 10 \times 16 \text{ g} = 160 \text{ g}$$

$$\text{O} \quad (160/284) \times 100\% = 56.3\%$$

molar mass = 284 g/mole

sums up to 100%

16. Limestone is calcium carbonate,  $\text{CaCO}_3$ . A quick check on table F shows you that most carbonates are insoluble in water, with exceptions being ammonium and Group 1 metals. Calcium is in group 2, so  $\text{CaCO}_3$  is insoluble in water.

17. In the reaction it is shown that heat is added to the one reactant (calcium carbonate), and when energy is a reactant, it is an endothermic reaction.