

Chemistry Form 10 – Solutions

No.	Solutions	Points
1	$2\text{HNO}_3(\text{aq}) + \text{Na}_2\text{CO}_3(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g}) + 2\text{NaNO}_3(\text{aq})$ $2\text{H}^+(\text{aq}) + \text{CO}_3^{2-}(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$	2
	$\text{Ba}(\text{NO}_3)_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaNO}_3(\text{aq})$ $\text{Ba}^{2+}(\text{aq}) + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4(\text{s})$	2
	$\text{NaCl}(\text{aq}) + \text{AgNO}_3(\text{aq}) \rightarrow \text{NaNO}_3(\text{aq}) + \text{AgCl}(\text{s})$ $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$	2
2		
a.	$\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$	1
	$\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$ or $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{H}_2\text{CO}_3(\text{aq})$	1
b.	$n(\text{Ca}) = n(\text{CaO}) = \frac{14,4 \text{ g}}{56 \text{ g/mol}} = 0,257 \text{ mol}$ $m(\text{Ca}) = 0,257 \text{ mol} \times 40 \text{ g/mol} = 10,29 \text{ g}$	1
	The percentage of calcium is: $\frac{10,29 \text{ g}}{50 \text{ g}} \times 100\% = 20,57\%$	1
	$m(\text{HCl sol.}) = 100 \text{ ml} \times 1,1 \text{ g/mol} = 110 \text{ g}$	1
	$m(\text{HCl}) = 110 \text{ g} \times 0,20 = 22 \text{ g}$	1
	$\text{CaO} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$ $m(\text{HCl used}) = 2 n(\text{CaO}) \times M(\text{HCl}) = 18,76 \text{ g}$	1
	$m(\text{HCl left}) = 22 \text{ g} - 18,76 \text{ g} = 3,24 \text{ g}$	1
c.	One point for every good statement, for example: <ul style="list-style-type: none"> • both in same group of Periodic Table; • both have two electrons in outer shell ; • two electrons lost to form ion. 	3
3		
a.	CO_2 or HCl or HI or ICl or ICl_3 or H_2O or CH_4	1
b.	O_2 or Cl_2 or H_2	1
c.	NaCl or NaI	1
d.	Cl and I	1
e.	Na_2O	1
f.	Na or C as grafite	1
g.	Ar	1
h.	NaCl or NaI	1
4		
a.	Water or dinitrogen oxide (N_2O or nitrous oxide) or O_3 (accept correct formula instead of a name)	1
b.	Any two sources: Natural sources – respiration (by animals); decay of plants or animals; oxidation of soils humus; forest fires caused by lightning; volcanoes Man-made sources – combustion of fossil fuels and wood; burning trash	2
c.	Any three from: By photosynthesis; by dissolving in oceans; by the formation of (calcium) carbonate or limestone; by the formation of oil or coal or fossil fuels.	3
d.	$0,2 \text{ g CO}_2$ in 100g water on 15°C	1
	$V(\text{H}_2\text{O}) = 100 \text{ g} \times 1 \text{ g/cm}^3 = 100 \text{ cm}^3$ $m(\text{CO}_2) = 2000 \text{ g}$ (in 1 m^3 water)	1

	$\text{Ca}^{2+} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{CaCO}_3 + 2\text{H}^+$ or $\text{Ca}^{2+} + \text{H}_2\text{CO}_3 \rightarrow \text{CaCO}_3 + 2\text{H}^+$	1
	$m(\text{CaCO}_3) = \frac{2000 \text{ g} \times 100 \text{ g/mol}}{44 \text{ g/mol}} = 4545.5 \text{ g}$	1
5.		
a.	C_7H_{16}	1
b.	i) because of partial / incomplete combustion (in reaction 2) or complete combustion (in reaction 1) ii) in $\text{CO}_2 - \text{C}^{+4}$, in $\text{CO} - \text{C}^{+2}$	1 2
c.	$n(\text{CO}_2) = \frac{15,57 \text{ l}}{22,4 \text{ l/mol}} = 0,695 \text{ mol}$ $\text{C}_6\text{H}_{14} + 9.5\text{O}_2 \rightarrow 6\text{CO}_2 + 7\text{H}_2\text{O}$ $\text{C}_{10}\text{H}_{22} + 15.5\text{O}_2 \rightarrow 10\text{CO}_2 + 11\text{H}_2\text{O}$ System of equations is formed, where $n(\text{C}_{10}\text{H}_{22}) = x \text{ mol}$; $n(\text{C}_6\text{H}_{14}) = y \text{ mol}$ $10x + 6y = 0,695$ $144x + 86y = 10$ $x = 0,0575 \text{ mol}$ and $y = 0,02 \text{ mol}$ $m(\text{C}_{10}\text{H}_{22}) = 8.28 \text{ g}$ and $w\%(\text{C}_{10}\text{H}_{22}) = 82.8 \%$ $m(\text{C}_6\text{H}_{14}) = 1.72 \text{ g}$ and $w\%(\text{C}_6\text{H}_{14}) = 17.2 \%$ $n(\text{O}_2) = 0.0575 \text{ mol} \times 9.5 + 0.02 \text{ mol} \times 15.5 = 0.835 \text{ mol}$ $V(\text{O}_2) = 18.7 \text{ l}$ $V(\text{air}) = 18.7 \text{ l} \times 100 / 21 = 89.1 \text{ l}$ Chosen another way and obtain a correct answer.	1 1 1 2 1 1 1 1 1 9