SOLUTION

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- Solution?
  ➔homogeneous mixture between two substances or more different types of substances
  Solution components:
  Solutes (solutes)
  Solvent (solvent)
  If the solution phase and phase constituent similar substances, a substance be in the greatest number
  ➔solvent, while other substances as solutes

Kinds of solution

Jenis Larutan	Zat penyusunnya
gasSolution	The mixture between a gas or vapor (in a comparison) Exp: air with N_2 as the solvent
Liquid solution	Solids, liquids, or gases dissolved in liquid solvent Exp: In an iodine alcohol, acetic acid hydrofoil, O_2 in water
Solid solution a. Dissolved gas in solids	H_2 gas in palladium metal, titanium metal gas N_2 in
b. Dlm liquid solid	Mercury in gold metal (amalgam)
c. Dissolved solids in the solids (alliance)	Zinc in copper (brass) Carbon in iron (steel) Tin in copper (copper)

Many kinds of substances composing	Binary solution (composed of 2 kinds of substances)
	Ternary solution (composed of 3 kinds of substances)
	Quaternary solution (composed of 4 types of substances)
Electrical conductivity properties	Electrolyte solution (to deliver electrical current)
	Nonelectrolyte solution (does not conduct electrical current)
The ability of a substance dissolved in the solvent	Solution was saturated / unsaturated-solution (still can dissolve some substances terlarutnya)
	Saturated solution / saturated-solution (solution containing solutes in maximal amount at a certain temperature)
	Supersaturated solution /-supersaturated solution (a solution containing the solute exceeds the maximum)

Protracted

- Dispersed solute molecules in water molecules, exp; sugar in water, oil in water, CCl_4 in benzene
  Interacting molecules / ions of the solute dg water molecules (interaction is usually called the hydration / solvation).

  Exp: HCl. NaCl, Na_2SO_4
- Reaction of the solute with the solvent (water)

  Exp: $2Na + 2H_2O \rightarrow 2Na^+ + 2OH^- + H_2$

Solution concentration

(number of substances in a number of solvent)

1. Mass Percent = %(b/b)

$$\%\,(massa) = \frac{massa\ zat\ terlarut}{(massa\ zat\ terlarut + massa\ pelarut)}\ x\ 100\%$$

exp:

- NaOH 10 % ➔ every 100 grams of this solution containing 10 g NaOH and 90 g of water, when the solvent water
- 10 ml H_2SO_4 95 %(density d 1,834) dissolved in 100 ml water

  (d 1,00) , the concentration

$$\%\,(massa) = \frac{(10)(1.834)(95\%)g\ H_2SO_4}{(10)(1{,}834)g + (100)(1{,}00)g}\ x\ 100\%$$

$$= 17{,}5\%$$

2. Volume Percent ➔ %(v/v)

$$\%\,(volum) = \frac{volum\ zat\ terlarut}{(volum\ zat\ terlarut + volum\ pelarut)}\ x\ 100\%$$

exp:

25 ml 70% alcohol mixed dg 75 ml of water, the concentration of alcohol :

$$\%\,(volum) = \frac{(25)(70\%)ml\ alkohol}{(25+75)mL}\ x\ 100\%$$

$$= 17{,}5\ \%\ alkohol$$

3. Parts Per Million (ppm)

$$bpj = \frac{bagian\ zat\ terlarut}{(bagian\ zat\ terlarut + bagian\ pelarut)}\ x\ 10^6$$

exp:

drinking water containing 2 ppm of iron in 1Lt ➔that drinking water contained 2 mg iron

30% CO_2 ➔bpj =

$$\frac{0.03\%\ CO_2}{100\%}\ x\ 10^6 = (0{,}03)(10^4) = 300$$

4. Molalitas

$$molalitas\ zat\ A = \frac{Mol\ zat\ A}{1000\ g\ pelarut} = \frac{massa\ zat\ A\ x\ 1000}{Mr\ zat\ A\ x\ massa\ pelarut}$$

5. Molarity

$$molaritas\ zat\ A = \frac{Mol\ zat\ A}{1L\ larutan} = \frac{{}^{g}/_{Mr}}{L}$$

1. Preparation of 250 mL of 0.1 M NaCl solution
   Planning:
   use NaCl with technical specifications (for kids SMP) dg
   Mr = 58.5 g / mol
   The calculation of the mass of NaCl = (0.25 L) (0.1 M) = 0.025 mol
   Gr = (0.025 mol) (58.5) = 1.5 g

dilution

$V_1 \times M_1 = V_2 \times M_2$

Exp:

- Make 500 mL of 3M HCl from concentrated HCl
  Molarity of concentrated HCl viewed on the packaging label eg 11.6 M

$V_{HCl\ pekat}$ =

- Retrieved: concentrated HCl = 129.3 mL distilled water
  ➔= (500 to 129.3) mL

$$\frac{(V_{HCl\ encer})(M_{HCl\ encer}}{M_{HCl\ pekat}} = \frac{(500\ mL)(3M)}{11{,}6\ M} = 129{,}3$$

- Make 500 mL solution of NH_4OH (d = 1.280) of concentrated ammonia 28% (w / v)
  For concentrated NH_4OH found d = 0.90 [NH_4OH] = 14.76 M
  To [NH_4OH] = 1M irapolasi to the value derived table:% NH3 = 1.72% and d = 0.9907
- or

$$V_{pekat} = \frac{V_1 \, x \, M_1}{M_{pekat}} = \frac{(500\,mL)(1M)}{14{,}76)} = 33{,}88 \approx 34\,mL$$

$$V_{pekat} = \frac{V_1 \, x \, P_1 \, x \, d_1}{P_{pekat} \, x \, d_{pekat}} = \frac{(500\,mL) \, x \, 1{,}72\,\% \, x \, 0{,}9907}{28\% \, x \, 0{,}90} = 33{,}81 \approx 34\,mL$$