



Chem!stry

Name: ()

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Defining Solubility Rules for Simple Salts – Macroconcept of Change

- Salts are ionic compounds comprising of a positively charged ion (cation) and a negatively charged ion (anion). Some salts are soluble in water and dissolve to form clear solutions (a homogeneous mixture). Other salts are insoluble in water and remain as solids at the bottom of the test tube (a heterogeneous mixture).
- Study the solubilities of the salts given in the tables on page 1 and page 2 and identify general trends in solubility – which types of salts are soluble in water and which types of salts are insoluble in water? Answer the questions on page 2 and page 3 to guide your thinking.

***Note:** The solubility of a salt in water changes with temperature. The following information refers to the solubility of salts in water at room temperature, which is taken to be 25 °C.

	Formula of Salt	Solubility*
1.	NaCl	soluble
2.	NH ₄ Cl	soluble
3.	Al ₂ (CO ₃) ₃	insoluble
4.	KCl	soluble
5.	FeSO ₄	soluble
6.	AlPO ₄	insoluble
7.	Ag ₂ SO ₄	slightly soluble
8.	CuCO ₃	insoluble
9.	NaOH	soluble
10.	CaSO ₄	insoluble
11.	FeCl ₂	soluble
12.	NH ₄ NO ₃	soluble
13.	Fe ₃ (PO ₄) ₂	insoluble
14.	Pb ₃ (PO ₄) ₂	insoluble
15.	CuSO ₄	soluble

	Formula of Salt	Solubility*
16.	Zn(NO ₃) ₂	soluble
17.	(NH ₄) ₂ CO ₃	soluble
18.	Ag ₃ PO ₄	insoluble
19.	NH ₄ OH	soluble
20.	CaCl ₂	soluble
21.	Mg(OH) ₂	insoluble
22.	NaNO ₃	soluble
23.	Ca(OH) ₂	slightly soluble
24.	(NH ₄) ₃ PO ₄	soluble
25.	Fe(OH) ₂	insoluble
26.	Na ₂ CO ₃	soluble
27.	Fe(NO ₃) ₂	soluble
28.	Al ₂ (SO ₄) ₃	soluble
29.	MgCl ₂	soluble
30.	KOH	soluble

	Formula of Salt	Solubility*
31.	Na ₂ SO ₄	soluble
32.	AlCl ₃	soluble
33.	Ca(NO ₃) ₂	soluble
34.	Ca ₃ (PO ₄) ₂	insoluble
35.	K ₂ CO ₃	soluble
36.	(NH ₄) ₂ SO ₄	soluble
37.	Al(OH) ₃	insoluble
38.	AgOH	insoluble
39.	MgCO ₃	insoluble
40.	Cu(NO ₃) ₂	soluble
41.	Mg ₃ (PO ₄) ₂	insoluble
42.	PbCl ₂	insoluble
43.	PbCO ₃	insoluble
44.	K ₃ PO ₄	soluble
45.	MgSO ₄	soluble
46.	ZnCl ₂	soluble
47.	BaSO ₄	insoluble

	Formula of Salt	Solubility*
48.	AgNO ₃	soluble
49.	Cu ₃ (PO ₄) ₂	insoluble
50.	Al(NO ₃) ₃	soluble
51.	ZnCO ₃	insoluble
52.	FeCO ₃	insoluble
53.	CuCl ₂	soluble
54.	Mg(NO ₃) ₂	soluble
55.	Cu(OH) ₂	insoluble
56.	CaCO ₃	insoluble
57.	PbSO ₄	insoluble
58.	Pb(NO ₃) ₂	soluble
59.	Na ₃ PO ₄	soluble
60.	K ₂ SO ₄	soluble
61.	AgCl	insoluble
62.	Ag ₂ CO ₃	insoluble
63.	KNO ₃	soluble
64.	Pb(OH) ₂	insoluble

1. Write a statement that describes the **general solubility of sodium salts** in water. Your statement should include any exceptions to the general rule that you have identified.

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2. Write a statement that describes the **general solubility of potassium salts** in water. Your statement should include any exceptions to the general rule that you have identified.

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3. Write a statement that describes the **general solubility of ammonium salts** in water. Your statement should include any exceptions to the general rule that you have identified.

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4. Write a statement that describes the **general solubility** of **nitrates** in water. Your statement should include any exceptions to the general rule that you have identified.

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5. Write a statement that describes the **general solubility** of **chlorides** in water. Your statement should include any exceptions to the general rule that you have identified.

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6. Write a statement that describes the **general solubility** of **hydroxides** in water. Your statement should include any exceptions to the general rule that you have identified.

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7. Write a statement that describes the **general solubility** of **carbonates** in water. Your statement should include any exceptions to the general rule that you have identified.

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8. Write a statement that describes the **general solubility** of **sulfates** in water. Your statement should include any exceptions to the general rule that you have identified.

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9. Write a statement that describes the **general solubility** of **phosphates** in water. Your statement should include any exceptions to the general rule that you have identified.

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10. Bromine and iodine are both in the same Group of the Periodic Table as chlorine – Group 17. In general, what do you expect the solubilities of bromides and iodides to be?

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11. Sodium and potassium are both in Group 1 of the Periodic Table. In general, what do you expect the solubilities of the other Group 1 metal salts to be?

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12. Apply your knowledge by writing balanced chemical equations, with state symbols, for the following reactions. If the salt is soluble in water, write (aq). If the salt is insoluble in water, write (s). If the product is a liquid, write (l). If the product is a gas, write (g).

a) copper(II) sulfate + sodium hydroxide → copper(II) hydroxide + sodium sulfate

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b) calcium nitrate + potassium carbonate → calcium carbonate + potassium nitrate

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c) iron(II) chloride + sodium phosphate → iron(II) phosphate + sodium chloride

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d) silver nitrate + sodium chloride → silver chloride + sodium nitrate

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e) calcium chloride + ammonium sulfate → calcium sulfate + ammonium chloride

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f) copper(II) carbonate + nitric acid → copper(II) nitrate + water + carbon dioxide

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g) lead(II) nitrate + hydrochloric acid → lead(II) chloride + nitric acid

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h) calcium chloride + sulfuric acid → calcium sulfate + hydrochloric acid

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- Scan the QR Code to view the answers to this assignment.



http://www.chemist.sg/acids/defining_solubility_rules_ans.pdf