

Properties of Ionic Compounds Worksheet

- 1) Explain why ionic compounds do not conduct electricity in their crystalline form.
Electricity can only be conducted when ions are moving. In their crystalline form, the ions in the ionic compound are locked tightly in one place.

- 2) Why do metals and nonmetals usually form ionic compounds, whereas two bonded nonmetals are never ionic? Explain.
The difference in electronegativity between metals and nonmetals is high, meaning that it's very easy for electronegative nonmetals to take electrons from non-electronegative nonmetals. If both elements were metals, or if both were nonmetals, the electronegativities would be too similar for one element to take electrons from the other.

- 3) Why is the formation of ionic compounds exothermic?
The interaction of so many positive ions with negative ones gives ionic compounds considerable stability over their constituent elements. Because stable = lower in energy, this extra energy is given off as heat during the formation of ionic compounds.

- 4) Why do ionic compounds tend to be hard?
The cations and anions are locked tightly into place because of their opposite charges – as a result, it's difficult to move the ions and the material is very hard.

- 5) Describe whether the following 5 compounds are likely to be ionic or not ionic based on the properties given. Explain your reasoning.
 - Compound 1 has a melting point of 545 degrees Celsius and dissolves well in water. **The high melting point points toward an ionic compound, though the fact that it dissolves is irrelevant.**

 - Compound 2 is a brittle material that is used to melt road ice during storms. **This is ionic. The brittleness points toward this, though the road ice thing doesn't really give any useful information.**

 - Compound 3 melts at 85 degrees Celsius and catches fire when heated to 570 degrees Celsius. **This is a little ambiguous. Ionic compounds tend to have very high melting points, but in the case of organic solids this isn't necessarily true. The catching fire part, however, gives more evidence to this not being ionic.**

TYPES OF CHEMICAL BONDS

Name ANSWERS

Classify the following compounds as ionic (metal + nonmetal), covalent (nonmetal + nonmetal) or both (compound containing a polyatomic ion).

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|-----------------------------|-----------------|----------------------------|-----------------|
| 1. CaCl_2 | <u>IONIC</u> | 11. MgO | <u>IONIC</u> |
| 2. CO_2 | <u>COVALENT</u> | 12. NH_4Cl | <u>BOTH</u> |
| 3. H_2O | <u>COVALENT</u> | 13. HCl | <u>COVALENT</u> |
| 4. BaSO_4 | <u>BOTH</u> | 14. KI | <u>IONIC</u> |
| 5. K_2O | <u>IONIC</u> | 15. NaOH | <u>BOTH</u> |
| 6. NaF | <u>IONIC</u> | 16. NO_2 | <u>COVALENT</u> |
| 7. Na_2CO_3 | <u>BOTH</u> | 17. AlPO_4 | <u>BOTH</u> |
| 8. CH_4 | <u>COVALENT</u> | 18. FeCl_3 | <u>IONIC</u> |
| 9. SO_3 | <u>COVALENT</u> | 19. P_2O_5 | <u>COVALENT</u> |
| 10. LiBr | <u>IONIC</u> | 20. N_2O_3 | <u>COVALENT</u> |