

Name: _____

Date: _____ *Key*

Net Ionic Equations/Reaction Writing Packet (includes solubility rules)

Table 4.1 Solubility Guidelines for Common Ionic Compounds in Water

Soluble Ionic Compounds		Important Exceptions
Compounds containing	NO_3^-	None
	CH_3COO^-	None
	Cl^-	Compounds of Ag^+ , Hg_2^{2+} , and Pb^{2+}
	Br^-	Compounds of Ag^+ , Hg_2^{2+} , and Pb^{2+}
	I^-	Compounds of Ag^+ , Hg_2^{2+} , and Pb^{2+}
	SO_4^{2-}	Compounds of Sr^{2+} , Ba^{2+} , Hg_2^{2+} , and Pb^{2+}
Insoluble Ionic Compounds		Important Exceptions
Compounds containing	S^{2-}	Compounds of NH_4^+ , the alkali metal cations, Ca^{2+} , Sr^{2+} , and Ba^{2+}
	CO_3^{2-}	Compounds of NH_4^+ and the alkali metal cations
	PO_4^{3-}	Compounds of NH_4^+ and the alkali metal cations
	OH^-	Compounds of NH_4^+ , the alkali metal cations, Ca^{2+} , Sr^{2+} , and Ba^{2+}

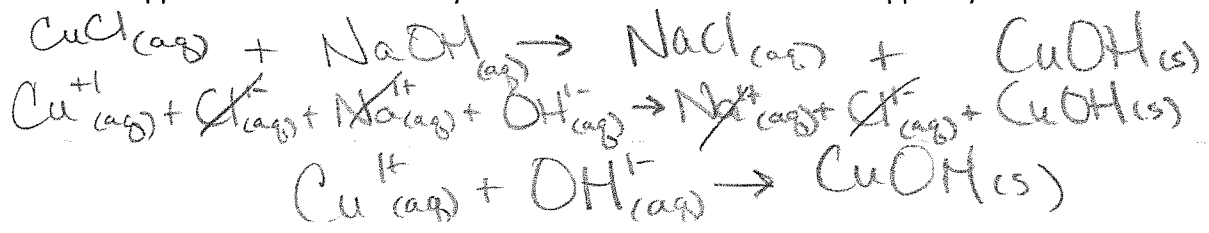
Complete statements 1-7 (1 point each)

- All Sulfates are S except *Sr, Ba, Hg, Pb*
- All Chlorides are S except..... *Ag*
- All Carbonates are I except *NH_4^+ and group I (alkali)*
- All Hydroxides are I except *NH_4^+ and group I and $\text{Ca}^{2+}, \text{Sr}^{2+}, \text{Ba}^{2+}$*
- All compounds of Group 1A elements are..... *soluble*
- All Ammonium compounds are.... *soluble*
- All Nitrates are *soluble*
- State whether the following are soluble (s) or insoluble (i).

- | | |
|------------------------------------|--|
| a. KCl <u>S</u> | e. PbI_2 <u>I</u> |
| b. NH_4OH <u>S</u> | f. CuCO_3 <u>I</u> |
| c. SrSO_4 <u>I</u> | g. Ag_2PO_4 <u>I</u> |
| d. NaBr <u>S</u> | h. $\text{Al}_2(\text{SO}_4)_3$ <u>S</u> |

9. Write the chemical equation for the following reaction. Then write the **complete ionic** and **net ionic equation**, cancelling the spectator ions. Assume all reactants are aqueous solutions and that one of the products is a **precipitate**. Include state symbols for each of the reactant and products.

Copper Chloride + Sodium Hydroxide \rightarrow Sodium Chloride and Copper Hydroxide



Solubility Table

<u>Ion</u>	<u>Solubility</u>	<u>Exceptions</u>
NO_3^-	soluble	none
ClO_4^-	soluble	none
Cl^-	soluble	except Ag^+ , Hg_2^{2+} , *Pb^{2+}
I^-	soluble	except Ag^+ , Hg_2^{2+} , *Pb^{2+}
SO_4^{2-}	soluble	except Ca^{2+} , Ba^{2+} , Sr^{2+} , Hg^{2+} , Pb^{2+} , Ag^+
CO_3^{2-}	insoluble	except Group IA and NH_4^+
PO_4^{3-}	insoluble	except Group IA and NH_4^+
OH^-	insoluble	except Group IA, *Ca^{2+} , Ba^{2+} , Sr^{2+}
S^{2-}	insoluble	except Group IA, IIA and NH_4^+
Na^+	soluble	none
K^+	soluble	none
NH_4^+	soluble	none

Write an S after the compound if it dissolves in water and write an I if it does not dissolve in water.

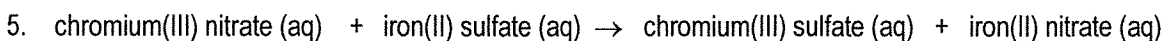
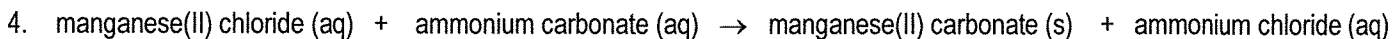
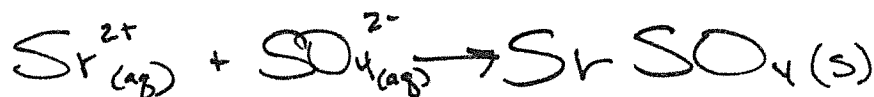
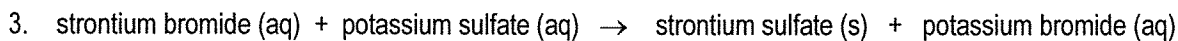
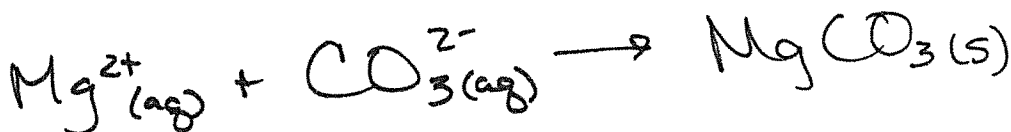
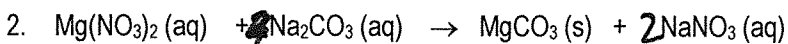
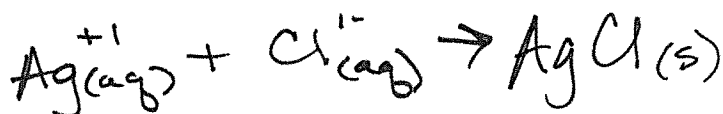
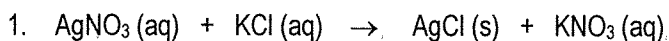
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|---------------------------------|----------|-------------------------|----------|
| 1. KCl | <u>S</u> | 1. Silver Nitrate | <u>S</u> |
| 2. NH_4OH | <u>S</u> | 2. Ammonium Carbonate | <u>S</u> |
| 3. SrSO_4 | <u>I</u> | 3. Copper (II) Chloride | <u>S</u> |
| 4. NaBr | <u>S</u> | 4. Mercury (I) Sulfate | <u>I</u> |
| 5. PbI_2 | <u>I</u> | 5. Sodium Sulfide | <u>S</u> |
| 6. CuCO_3 | <u>I</u> | 6. Ammonium phosphate | <u>S</u> |
| 7. Ag_2PO_4 | <u>I</u> | 7. Calcium Sulfate | <u>I</u> |
| 8. $\text{Al}_2(\text{SO}_4)_3$ | <u>I</u> | 8. Lead (II) Chloride | <u>I</u> |
| 9. $\text{Ba}(\text{OH})_2$ | <u>S</u> | 9. Strontium hydroxide | <u>S</u> |
| 10. AgCl | <u>I</u> | 10. Magnesium Chloride | <u>S</u> |

Practice Problems on Net Ionic Equations:

Show the total ionic and net ionic forms of the following equations. If all species are spectator ions, please indicate that no reaction takes place. Note! You need to make sure the original equation is balanced before proceeding! Use the solubility chart/guidelines from your notes, and be sure to include state symbols for full credit.

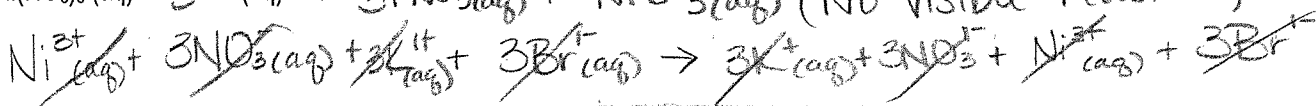
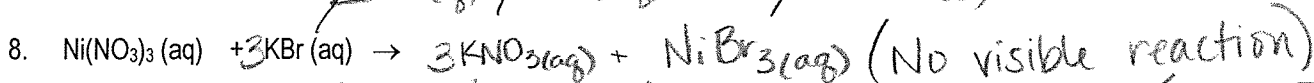
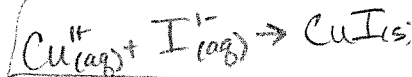
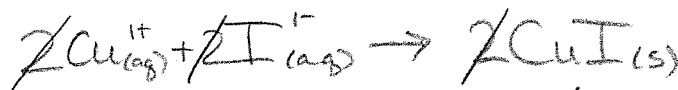
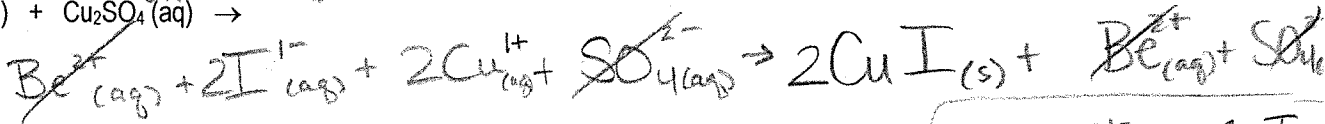
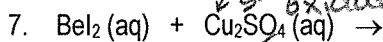
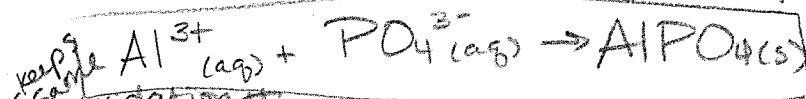
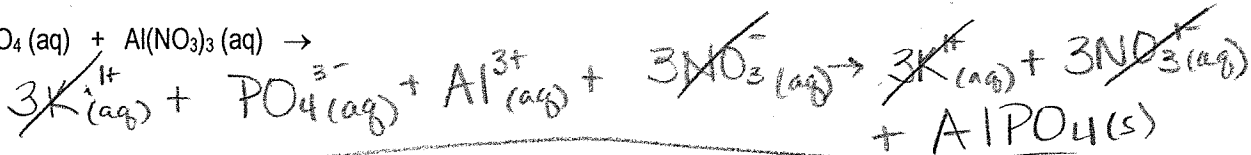
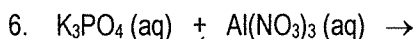
Solubility Rules

1. All salts of Group 1, and ammonium are soluble.
2. All salts of nitrates, chlorates and acetates are soluble.
3. All salts of halides (Group 17) are soluble except those of silver(I), copper(I), lead(II), and mercury(I).
4. All salts of sulfate are soluble except for barium sulfate, lead(II) sulfate, and strontium sulfate.
5. All salts of carbonate, phosphate and sulfite are insoluble, except for those of group 1 and ammonium.
6. All oxides and hydroxides are insoluble except for those of group 1, calcium, strontium, and barium.
7. All salts of sulfides are insoluble except for those of Group 1 and 2 elements and of ammonium.

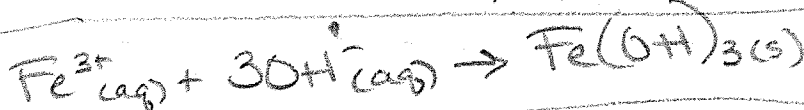
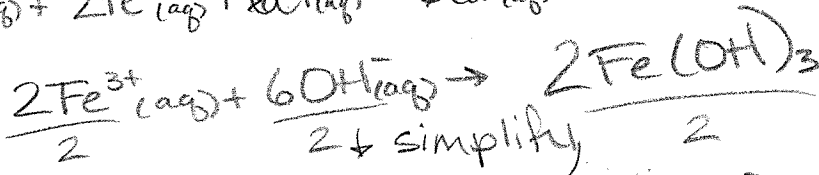
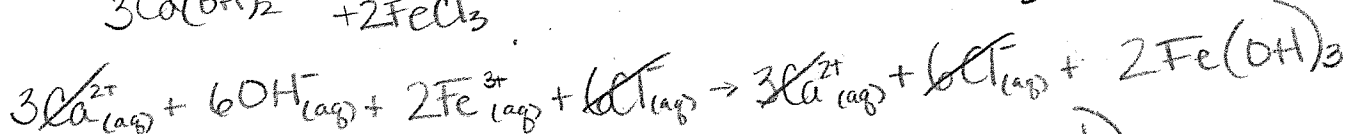
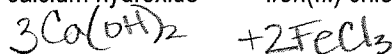
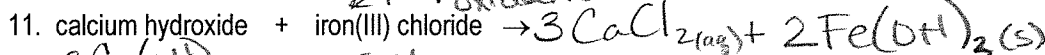
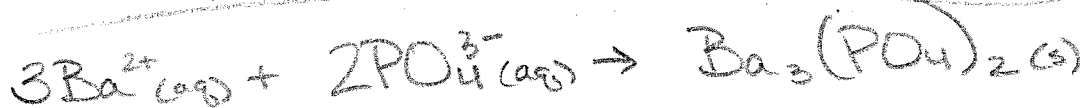
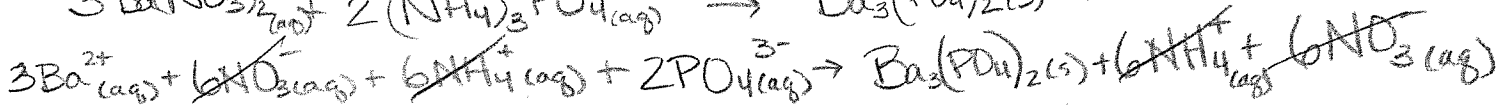
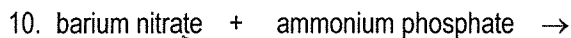
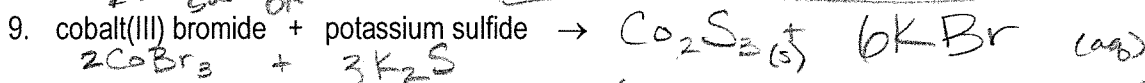


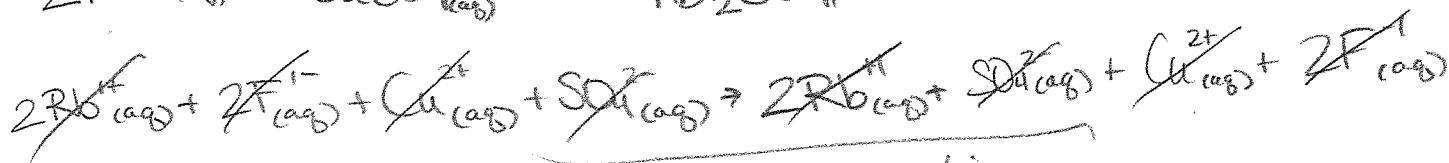
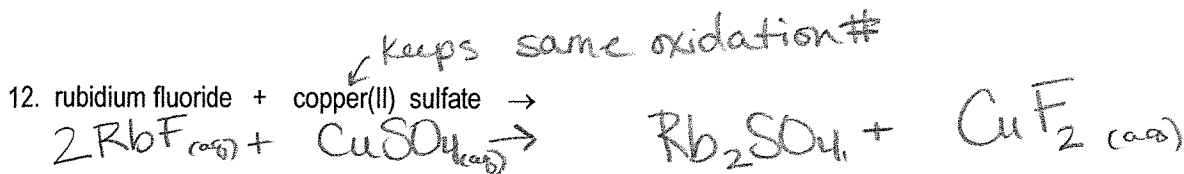
None?? No precipitate produced —
NR visible

Please complete the following reactions, and show the total ionic and net ionic forms of the equation. Use the solubility chart/guidelines from your notes, and be sure to include state symbols for full credit. If all species are spectator ions, please indicate that no reaction takes place.

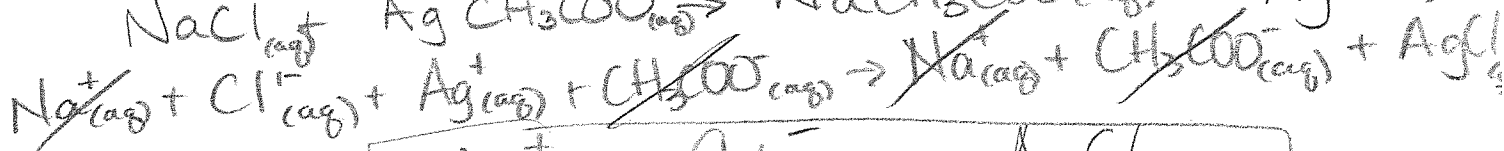
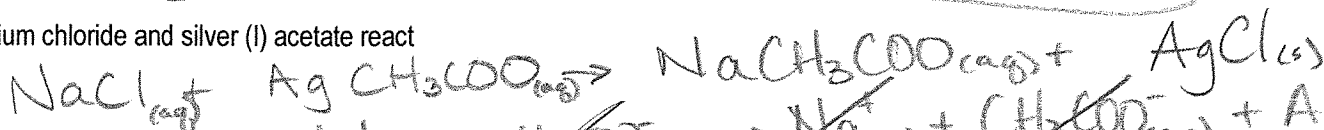
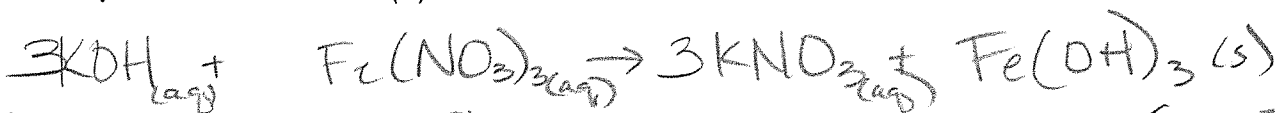
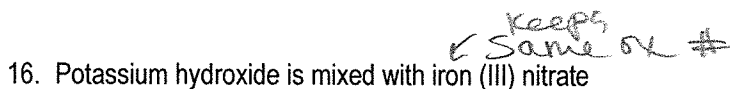
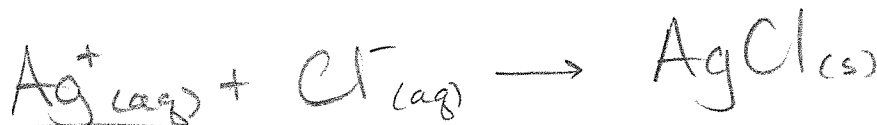
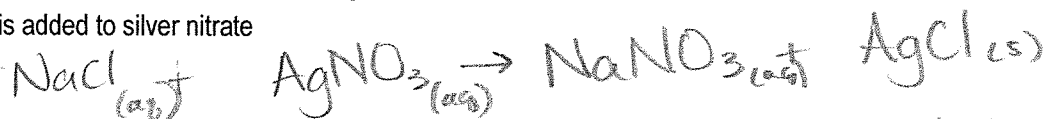
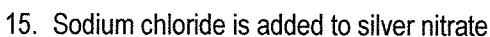
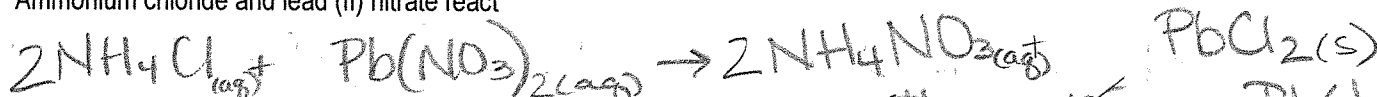
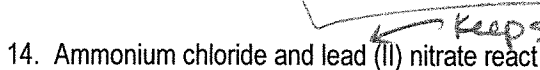
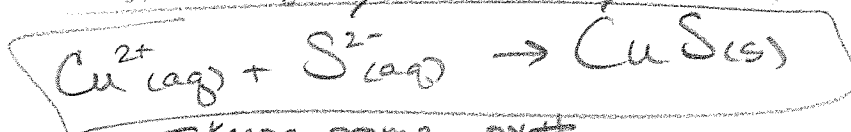
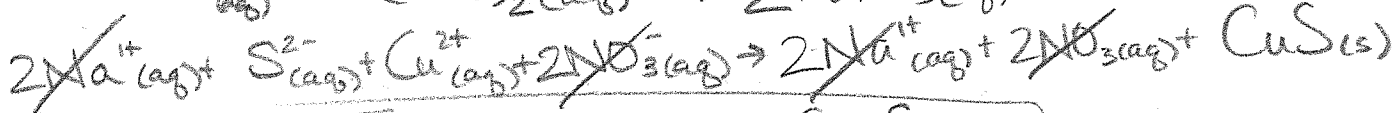
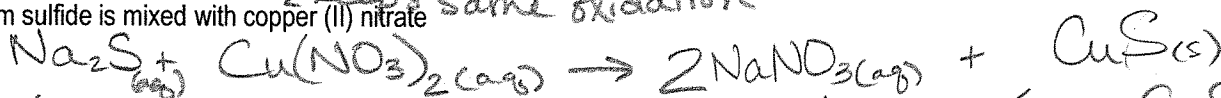


No visible reaction

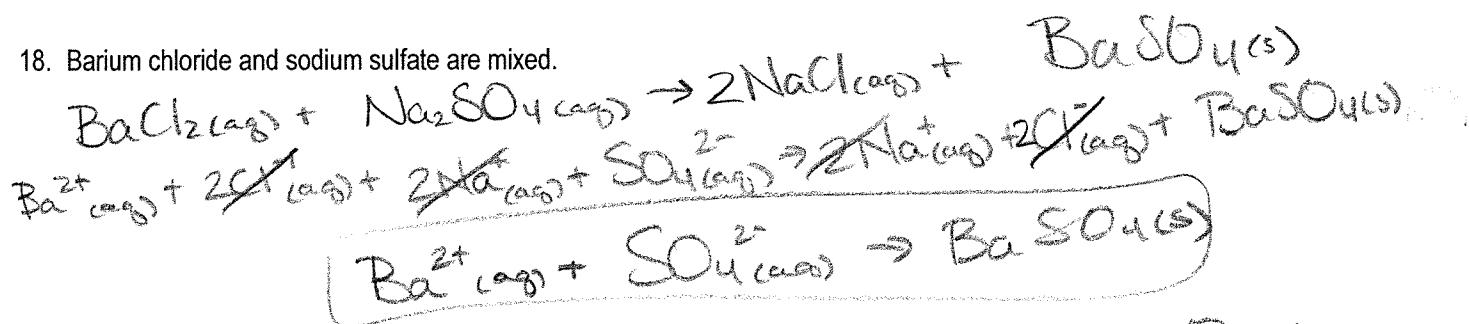




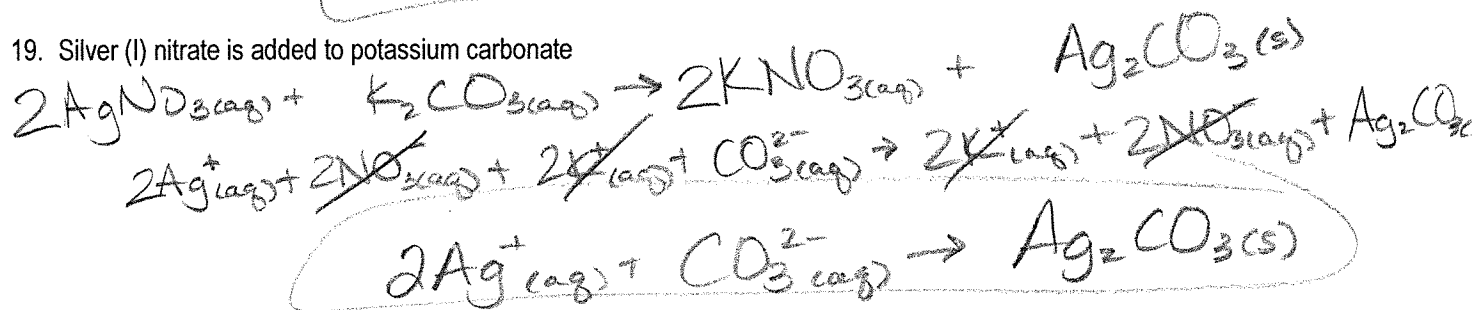
No visible reaction



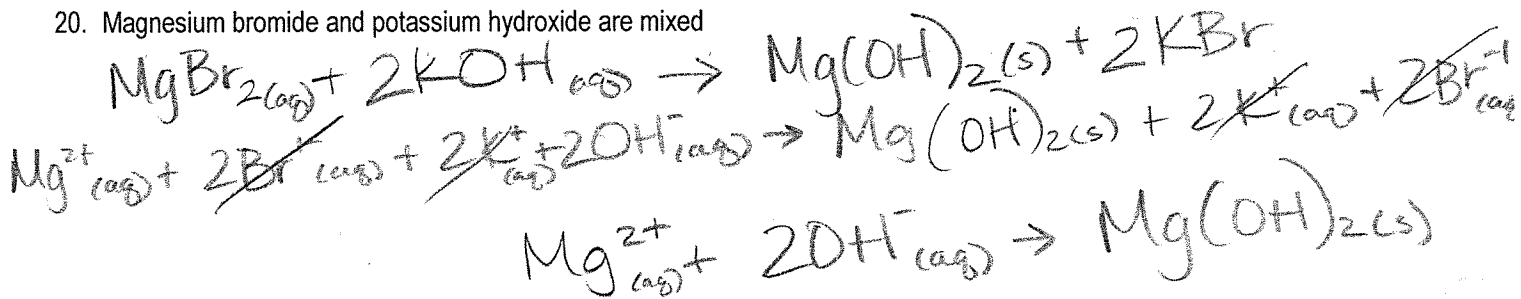
18. Barium chloride and sodium sulfate are mixed.



19. Silver (I) nitrate is added to potassium carbonate



20. Magnesium bromide and potassium hydroxide are mixed



21. Aluminum chloride reacts with potassium phosphate

