Let's break this down into reactions between different classes of compounds and their typical products. Note that exceptions and specific cases might vary based on the compounds involved.

1. Acid + Acid

- **Typically:** No reaction occurs.

- **Exceptions:** Some acids might react under specific conditions (e.g., sulfuric acid can react with nitric acid).

When sulfuric acid (H_2SO_4) and citric acid ($C_6H_8O_7$) are mixed, they generally do not react significantly under normal conditions. Both are acids and do not typically engage in a reaction with each other.

However, if concentrated sulfuric acid is used, it can act as a dehydrating agent, potentially leading to the dehydration of citric acid to form various carbon-containing compounds, such as carbon dioxide (CO_2) and water (H_2O). In this case, sulfuric acid would effectively dehydrate citric acid, which could involve the removal of water molecules.

The main reaction under these conditions might be:

$$\text{C}_6\text{H}_8\text{O}_7 \text{(citric acid)} + \text{H}_2\text{SO}_4 \text{(sulfuric acid)} \rightarrow \text{Dehydrated products (such as CO}_2\text{, H}_2\text{O)}$$

In summary, sulfuric acid can dehydrate citric acid, but under typical conditions with dilute solutions, no significant reaction between the two acids occurs.

2. Acid + Base

- **Product:** Salt + Water

- **Example:**

  - HCl + NaOH ’n NaCl + H_2O

  - H_2SO_4 + KOH ’n K_2SO_4 + H_2O

3. Acid + Oxide

- **Product:** Salt + Water

- **Example:**

  - HCl + MgO ′n $MgCl_2 + H_2O$

  - H_2SO_4 + ZnO ′n $ZnSO_4 + H_2O$

4. Acid + Salt

- **Product:** New Salt + New Acid

- **Example:**

  - HCl + Na_2CO_3 ′n $NaCl + H_2O + CO_2$

  - HNO_3 + NaCl ′n $NaNO_3$ + HCl

5. Acid + Insoluble Salt

- **Product:** Soluble Salt + Other Products

- **Example:**

  - HCl + $CaCO_3$ ′n $CaCl_2 + CO_2 + H_2O$

  - HNO_3 + PbS ′n $Pb(NO_3)_2 + H_2S$

6. Acid + Soluble Salt

- **Product:** New Salt + New Acid

- **Example:**

  - HCl + NaBr ′n NaCl + HBr

  - H_2SO_4 + $NaNO_3$ ′n $Na_2SO_4 + HNO_3$

7. Acid + Water

- **Product:** Acid Dissociation (Ionization)

- **Example:**

  - $HCl + H_2O \rightarrow H_3O^+ + Cl^-$

  - $H_2SO_4 + H_2O \rightarrow H_3O^+ + HSO_4^-$

8. Acid + Oxygen

- **Product:** Typically, oxidation or decomposition occurs.

- **Example:**

  - $2H_2SO_4 + O_2 \rightarrow 2HSO_3 + 2H_2O$ (only under specific conditions)

9. Acid + Element

- **Product:** Generally, salt and hydrogen gas.

- **Example:**

  - $HCl + Zn \rightarrow ZnCl_2 + H_2$

  - $H_2SO_4 + Fe \rightarrow Fe_2(SO_4)_3 + H_2$

10. Base + Acid

- **Product:** Salt + Water

- **Example:**

  - $NaOH + HCl \rightarrow NaCl + H_2O$

  - $KOH + H_2SO_4 \rightarrow K_2SO_4 + H_2O$

11. Base + Base

- **Product:** No reaction under normal conditions.

- **Exceptions:** Formation of a complex or precipitation if specific conditions apply.

12. Base + Oxide

- **Product:** Generally forms a salt and water (if the base is strong).

- **Example:**

  - $NaOH + ZnO \rightarrow Na_2ZnO_2 + H_2O$

  - $KOH + Al_2O_3 \rightarrow KAlO_2 + H_2O$

13. Base + Salt

- **Product:** New Base + New Salt

- **Example:**

  - $NaOH + Na_2SO_4 \rightarrow Na_2SO_4 + NaOH$ (no reaction under normal conditions)

14. Base + Insoluble Salt

- **Product:** Soluble Salt + Other Products

- **Example:**

  - $NaOH + PbSO_4 \rightarrow Pb(OH)_2 + Na_2SO_4$

15. Base + Soluble Salt

- **Product:** New Salt + New Base

- **Example:**

  - $NaOH + KNO_3 \rightarrow KOH + NaNO_3$

  - $NH_4OH + NaCl \rightarrow NH_4Cl + NaOH$

16. Base + Water

- **Product:** Base Dissociation (Ionization)

- **Example:**

  - $NaOH + H_2O \rightarrow Na^+ + OH^- + H_2O$

  - $KOH + H_2O \rightarrow K^+ + OH^- + H_2O$

17. Base + Oxygen

- **Product:** Generally forms a peroxide or superoxide.

- **Example:**

  - $2NaOH + O_2 \rightarrow Na_2O_2 + H_2O$

  - $2KOH + O_2 \rightarrow K_2O_2 + H_2O$

18. Base + Element

- **Product:** Typically forms a salt and hydrogen gas.

- **Example:**

  - $NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$

  - $KOH + Al \rightarrow KAlO_2 + H_2$

19. Oxide + Acid

- **Product:** Salt + Water

- **Example:**

  - $MgO + 2HCl \rightarrow MgCl_2 + H_2O$

  - $SO_3 + H_2O \rightarrow H_2SO_4$

20. Oxide + Base

- **Product:** Salt + Water

- **Example:**
  - $MgO + 2NaOH \rightarrow Na_2MgO_2 + H_2O$
  - $ZnO + 2KOH \rightarrow K_2ZnO_2 + H_2O$

21. Oxide + Oxide

- **Product:** Typically forms complex oxides or mixtures.
- **Example:**
  - $2FeO + O_2 \rightarrow 2Fe_2O_3$
  - $CaO + SO_3 \rightarrow CaSO_4$

22. Oxide + Salt

- **Product:** Generally no reaction unless specific conditions apply.

23. Oxide + Insoluble Salt

- **Product:** Usually no reaction under normal conditions.

24. Oxide + Soluble Salt

- **Product:** Typically no reaction.

25. Oxide + Water

- **Product:** Hydroxide
- **Example:**
  - $Na_2O + H_2O \rightarrow 2NaOH$
  - $CO_2 + H_2O \rightarrow H_2CO_3$

26. Oxide + Oxygen

- **Product:** Usually no reaction.

27. Oxide + Element

- **Product:** Generally forms a new oxide or complex.
- **Example:**
  - $FeO + Cl_2$ ′n $FeCl_2 + O_2$

28. Salt + Acid

- **Product:** New Salt + New Acid
- **Example:**
  - $NaCl + H_2SO_4$ ′n $NaHSO_4 + HCl$
  - $KCl + HNO_3$ ′n $KNO_3 + HCl$

29. Salt + Base

- **Product:** New Salt + New Base
- **Example:**
  - NaCl + NaOH ′n NaOH + NaCl (no reaction)

30. Salt + Oxide

- **Product:** Generally no reaction under normal conditions.

31. Salt + Salt

- **Product:** Usually no reaction.

32. Salt + Insoluble Salt

- **Product:** Often forms a precipitate if the resulting product is insoluble.

33. Salt + Soluble Salt

- **Product:** Generally no reaction unless specific conditions apply.

34. Salt + Water

- **Product:** Dissociation of the salt into ions.

35. Salt + Oxygen

- **Product:** Generally no reaction.

36. Salt + Element

- **Product:** Typically no reaction unless specific conditions apply.

37. Carbonate + Carbonate

- **Product:** Generally no reaction.

38. Carbonate + Sulfate

- **Product:** Typically no reaction.

39. Carbonate + Hydroxide

- **Product:** Usually forms a new carbonate and water.

- **Example:**

  - $Na_2CO_3 + Ca(OH)_2$ ′n $CaCO_3 + 2NaOH$

40. Carbonate + Ammonium

- **Product:** Carbon dioxide, water, and ammonia gas.
- **Example:**
  - $(NH_4)_2CO_3$ ′n $CO_2 + 2NH_3 + H_2O$

41. Carbonate + Phosphate

- **Product:** Typically forms a new salt or complex.

42. Carbonate + Carbonate (Duplicate of 37)

43. Carbonate + Sulfate (Duplicate of 38)

44. Carbonate + Hydroxide (Duplicate of 39)

45. Carbonate + Ammonium (Duplicate of 40)

46. Carbonate + Phosphate (Duplicate of 41)

47. Sulfate + Carbonate

- **Product:** Typically forms a precipitate.
- **Example:**
  - $Na_2SO_4 + BaCO_3$ ′n $BaSO_4 + Na_2CO_3$

48. Sulfate + Sulfate

- **Product:** Generally no reaction.

49. Sulfate + Hydroxide

- **Product:** Typically forms a new salt and water.

- **Example:**

  - $Na_2SO_4 + Ca(OH)_2$ ′n $CaSO_4 + 2NaOH$

50. Sulfate + Ammonium

- **Product:** Generally forms a new salt.

51. Sulfate + Phosphate

- **Product:** Typically forms a precipitate.

- **Example:**

  - $Na_2SO_4 + Ca_3(PO_4)_2$ ′n $CaSO_4 + Na_3PO_4$

52. Hydroxide + Carbonate

- **Product:** Typically forms a new carbonate and water.

- **Example:**

  - $NaOH + Na_2CO_3$ ′n $Na_2CO_3 + H_2O$

  - $KOH + CaCO_3$ ′n $K_2CO_3 + Ca(OH)_2$

53. Hydroxide + Sulfate

- **Product:** Typically forms a new salt and water.

- **Example:**

  - $NaOH + MgSO_4$ ′n $Mg(OH)_2 + Na_2SO_4$

- $KOH + FeSO_4$ ′n $Fe(OH)_2 + K_2SO_4$

54. Hydroxide + Hydroxide

- **Product:** Generally no reaction, but mixing can form complex ions.

55. Hydroxide + Ammonium

- **Product:** Typically forms ammonia gas and water.
- **Example:**
  - $NH_4OH + NaOH$ ′n $NaNH_2 + H_2O$
  - $NH_4Cl + KOH$ ′n $KCl + NH_3 + H_2O$

56. Hydroxide + Phosphate

- **Product:** Typically forms a new phosphate and water.
- **Example:**
  - $NaOH + Ca_3(PO_4)_2$ ′n $Ca(OH)_2 + Na_3PO_4$

57. Ammonium + Carbonate

- **Product:** Typically forms carbon dioxide, ammonia gas, and water.
- **Example:**
  - $(NH_4)_2CO_3$ ′n $CO_2 + 2NH_3 + H_2O$

58. Ammonium + Sulfate

- **Product:** Typically forms a new salt.
- **Example:**
  - $(NH_4)_2SO_4$ ′n $NH_4HSO_4 + NH_4HSO_4$

59. Ammonium + Hydroxide

- **Product:** Typically forms ammonia gas and water.

- **Example:**

  - $NH_4Cl + NaOH \rightarrow NaCl + NH_3 + H_2O$

60. Ammonium + Ammonium

- **Product:** Generally no reaction under normal conditions.

61. Ammonium + Phosphate

- **Product:** Typically forms a new salt.

- **Example:**

  - $(NH_4)_3PO_4 \rightarrow NH_4H_2PO_4$

62. Phosphate + Carbonate

- **Product:** Typically forms a new phosphate and carbonate.

- **Example:**

  - $Na_3PO_4 + CaCO_3 \rightarrow Ca_3(PO_4)_2 + Na_2CO_3$

63. Phosphate + Sulfate

- **Product:** Typically forms a new phosphate and sulfate.

- **Example:**

  - $Na_3PO_4 + MgSO_4 \rightarrow Mg_3(PO_4)_2 + Na_2SO_4$

64. Phosphate + Hydroxide

- **Product:** Typically forms a new phosphate and water.

- **Example:**

  - Na_3PO_4 + $Ca(OH)_2$ ′n $Ca_3(PO_4)_2$ + NaOH

65. Phosphate + Ammonium

- **Product:** Typically forms a new salt.

- **Example:**

  - $(NH_4)_3PO_4$ ′n $NH_4H_2PO_4$

66. Phosphate + Phosphate

- **Product:** Generally forms no new product under normal conditions.

Key Points and Exceptions

- **Acid-Base Reactions:** Usually produce salt and water.

- **Acid + Metal Oxides:** Produces salt and water.

- **Acid + Metals:** Produces salt and hydrogen gas.

- **Base + Acid:** Forms salt and water.

- **Base + Oxides:** Typically forms salts and water.

- **Oxide + Water:** Forms hydroxides (or carbonic acid for CO_2).

- **Salts + Water:** Dissociate into ions.

- **Complex Reactions:** Sometimes involve multiple steps or specific conditions.

These general rules and examples provide a broad overview, but actual reactions may depend on specific conditions and concentrations.