

- C) proceeds in the presence of a catalyst;
- D) low degree of contamination with heavy metals;
- E) accompanied by high energy consumption.

**15. The method for producing phosphoric acid by decomposing natural phosphates with sulfuric acid is called:**

- A) catalytic;
- B) electrothermal;
- C) extraction;
- D) absorption;
- E) electrochemical.

**16. The raw materials for obtaining extraction phosphoric acid are:**

- A) apatites, phosphorites;
- B) carnalite, nepheline, tincal;
- C) limestone, bauxite;
- D) gypsum, alunites, soda;
- E) kainite, sylvinite.

**17. Stages of obtaining extraction phosphoric acid:**

- A) decomposition of apatite → pulp filtration → drying → flushing of sediment;
- B) carnalite decomposition → pulp filtration → flushing of sediment;
- C) decomposition of phosphates → pulp filtration → flushing of sediment;
- D) decomposition of phosphates → pulp filtration → drying → calcination;
- E) decomposition of phosphates → pulp filtration → crystallization.

**18. Extraction phosphoric acid is obtained by decomposition of phosphate feedstock with sulfuric acid by the reaction:**

- A)  $2\text{Ca}_5(\text{PO}_4)_3\text{F} + 14\text{HNO}_3 + 3\text{H}_2\text{O} \rightarrow 3\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O} + 7\text{Ca}(\text{NO}_3)_2 + 2\text{HF}$ ;
- B)  $\text{Ca}_5(\text{PO}_4)_3\text{F} + 2\text{H}_2\text{SO}_4 \rightarrow 3\text{CaHPO}_4 + 2\text{CaSO}_4 + \text{HF}$ ;
- C)  $2\text{Ca}_5(\text{PO}_4)_3\text{F} + 7\text{H}_2\text{SO}_4 + 3\text{H}_2\text{O} \rightarrow 3\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O} + 7\text{CaSO}_4 + 2\text{HF}$ ;
- D)  $\text{Ca}_3(\text{PO}_4)_2 + 6\text{HNO}_3 \rightarrow 3\text{Ca}(\text{NO}_3)_2 + 2\text{H}_3\text{PO}_4$ ;
- E)  $\text{Ca}_5(\text{PO}_4)_3\text{F} + 5\text{H}_2\text{SO}_4 + n\text{H}_3\text{PO}_4 + \text{H}_2\text{O} \rightarrow (n+3)\text{H}_3\text{PO}_4 + 5\text{CaSO}_4 \cdot 2\text{H}_2\text{O} + \text{HF}$ .

**19. The process of obtaining extraction phosphoric acid is affected by:**

- A) apparatus design;
- B) low pressure;
- C) low temperature;
- D) a catalyst;
- E) impurities.

**20. The composition of extraction phosphoric acid includes:**

- A)  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_3$ ,  $\text{H}_2\text{O}$ ,  $\text{MgSiF}_6$ ;
- B)  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{O}$ ,  $\text{CaO}$ ,  $\text{SO}_3$ ,  $\text{MgO}$ ,  $\text{R}_2\text{O}_3$ ,  $\text{F}$ ;
- C)  $\text{H}_3\text{PO}_4$ ,  $\text{BaO}$ ,  $\text{NiO}$ ,  $\text{Na}_2\text{O}$ ;
- D)  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{O}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{SiF}_4$ ;
- E)  $\text{H}_3\text{PO}_4$ ,  $\text{MgO}$ ,  $\text{As}$ ,  $\text{K}_2\text{O}$ ,  $\text{H}_2\text{SO}_4$ .

**21. What is released into the gas phase in the process of sulfuric acid decomposition of natural phosphates:**

- A)  $\text{SiF}_4$ ;
- B)  $\text{PH}_3$ ;
- C)  $\text{SO}_2$ ;