CLAIMS

1. A process for producing cumene, the process comprising:

(a) contacting benzene with a C_3 alkylating agent comprising isopropanol, and optionally propylene, under alkylation conditions such that at least part of said C_3 alkylating agent reacts with the benzene to produce an alkylation effluent comprising cumene, unreacted benzene and water;

(b) recovering cumene from said alkylation effluent;

(c) removing water from said alkylation effluent to form a dried effluent stream;

(d) treating an aliquot of the dried effluent stream to remove nitrogenous impurities therefrom and produce a purified recycle stream; and

(e) recycling at least part of the purified recycle stream to said contacting (a).

2. The process of claim 1, wherein the contacting (a) takes place in the presence of a molecular sieve alkylation catalyst.

3. The process of claim 2, wherein said alkylation catalyst comprises at least one zeolite catalyst selected from the group ~~comprising~~ consisting of ZSM-3, ZSM-4, ZSM-5, ZSM-11, ZSM-12, ZSM-14, ZSM-18, ZSM-20, ZSM-22, ZSM-23, ZSM-35, ZSM-48, zeolite beta, zeolite Y, Ultrastable Y (USY), Dealuminized Y (Deal Y), mordenite, MCM-22, PSH-3, SSZ-25, ERB-1, ITQ-1, ITQ-2, MCM-36, MCM-49, MCM-56, and UZM-8.

4. The process of ~~any preceding~~ claim 1, wherein the alkylation conditions comprise a temperature of 20°C to 350°C, a pressure of 100 kPa to 20,000 kPa, and a molar ratio of benzene to C_3 alkylating agent (isopropanol plus any propylene) fed to said alkylation zone of 0.1:1 to 100:1.

5. The process of ~~any preceding~~ claim 1, wherein the C_3 alkylating agent comprises a mixture of isopropanol and propylene at molar ratio of isopropanol to propylene of about 100 to 1 to about 1 to 100.

6. The process of ~~any preceding~~ claim 1, wherein fresh benzene, recycle benzene and/or fresh C_3 alkylating agent is mixed with the aliquot of the dried recycle ~~steam~~ stream prior to said treating (c).

7. The process of ~~any preceding~~ claim 1, wherein the treating (d) includes passing the aliquot of the dried recycle stream through at least one solid adsorbent.

8. The process of claim 7, wherein the at least one solid adsorbent is selected from a molecular sieve, a resin, an acidic clay and a membrane.

9. The process of ~~any one of claims 1 to 6~~ claim 1, wherein the treating (d) includes washing the aliquot of the dried recycle stream with an acidic water solution.

10. The process of ~~any preceding~~ claim 1, wherein cumene is recovered in (b) from the portion of the dried effluent stream remaining after separation of the aliquot for the treating (d).

11. An integrated process for producing phenol comprising the process of producing cumene as claimed in ~~any preceding~~ claim 1 and the following additional steps:

(f) oxidizing at least part of the cumene recovered in (b) to form cumene hydroperoxide;

(g) cleaving at least part of the cumene hydroperoxide from (f) to form a cleavage product stream containing phenol and acetone;

(h) separating at least part of the acetone from the cleavage product stream;

(i) hydrogenating at least part of the acetone separated in (h) to produce isopropanol; and

(j) recycling at least part of the isopropanol produced in (i) to the contacting (a).

12. A process for producing cumene comprising, the process comprising:

(a) mixing fresh and/or recycled benzene with a C_3 alkylating agent comprising isopropanol, and optionally propylene, to produce a combined feed stream;

(b) treating at least part of said combined feed stream to remove nitrogenous impurities therefrom and produce a purified combined feed stream; and

(c) contacting said purified combined feed stream with an alkylation catalyst in an alkylation zone under alkylation conditions such that at least part of said isopropanol and benzene react to produce an alkylation effluent comprising cumene.

13. The process of claim 12, wherein said treating (b) includes passing at least part of said combined feed stream through at least one solid adsorbent.

14. The process of claim 13, wherein the at least one solid adsorbent is selected from a molecular sieve, a resin, an acidic clay and a membrane.

15. The process of claim 12, wherein the treating (b) includes washing at least part of the combined feed stream with an acidic water solution.

16. The process of ~~any one of claims 12 to 15~~ claim 12, wherein the alkylation effluent also comprises water and unreacted benzene and the process further comprises:

(i) removing water from at least part of the alkylation effluent to form a dried effluent stream; and

(ii) including said dried effluent stream in said combined feed stream produced in (a).

17. An integrated process for producing phenol comprising the process of producing cumene as claimed in ~~any one of claims 12 to 15~~ claim 12 and the following additional steps:

(d) oxidizing at least part of the cumene produced in (c) to form cumene hydroperoxide;

(e) cleaving at least part of the cumene hydroperoxide from (d) to form a cleavage product stream containing phenol and acetone;

(f) separating at least part of the acetone from the cleavage product stream;

(g) hydrogenating at least part of the acetone separated in (f) to produce isopropanol; and

(h) recycling at least part of the isopropanol produced in (g) to the mixing (a).