AOAC Official Method 984.14

Ethanol in Beer Gas Chromatographic Method

First Action 1984 Final Action 1988

ASBC-AOAC Method

Principle

A.

n-Propanol internal standard is added to sample, and ethanol is determined by GC using flame ionization detection.

Reagents and Apparatus

B.

a) n-Propanol-internal standard 5% aqueous stock solution. Refrigerate.

b) Ethanol standard solutions.-3, 4, 5, 6, 7, and 8% aqueous ethanol solutions. Determine exact % ethanol by pycnometer, **942.06B(a)** (see 26.1.07), hydrometer, **957.03A** (see 26.1.08), or refractometer, **950.04** (see 26. 1.10). Alternatively, prepare standard solutions by quantitative dilution of concentrated ethanol solution analyzed by one of above techniques. Keep solutions refrigerated.

c) Gas chromatograph.-With flame ionization detector and 6 ft x 1/8 in. stainless steel or glass column containing 80-100 mesh Chromosorb 103. He or N_2 carrier gas 20 mL/min; injector temperature 175°; column temperature 185° isothermal (adjust temperature so ethanol elutes in 1 min, n-propanol in 1.6 min); detector temperature 250°; chart speed 0.2 in./min; attenuation as required for on-scale peaks.

Calibration

C.

Pipet 5.0 mL ethanol standard solutions into separate glass-stoppered flasks. Add 5.0 mL internal standard solution to each and mix well. Inject 0.2 μL of each solution in duplicate and measure peak heights (integrator may be used). Calculate ratio of ethanol to n-propanol peaks and average for each concentration. Plot ratio against concentration and calculate slope of line (F). Repeat analysis of 5% ethanol standard solution each day.

Decarbonate beer by filtering through S&S 560 or equivalent paper. Pipet 5.0 mL into glass-stoppered flask. Add 5.0 mL aqueous n-propanol internal standard solution. Mix thoroughly by swirling, and inject 0.2 μL onto GC column, and determine ratio of ethanol to n-propanol peaks.

Calculation

D.

Ethanol, % (volume/volume) = (EtOH peak height/n-propanol peak height)/F

Reference: JAOAC **67**, 192 (1984)