论文

牛奶水溶液的荧光光谱研究

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摘要:

采集伊利、蒙牛公司生产的纯牛奶、高钙奶、高钙低脂奶,向5 mL去离子水中分别加入0.17 mL、0.20 mL、0.23 mL、0.26 mL、0.29 mL、0.32 mL、0.35 mL这6种牛奶样品,得到42份牛奶水溶液.采用日立F-4600荧光光谱仪测定样品在波长为315 nm、320 nm、325 nm、330 nm、335 nm、340 nm、345 nm激发光诱导下的荧光发射光谱,对所得荧光光谱进行Savitzky-Golay平滑、FFT低通滤波后,利用高斯分解法对荧光谱线进行分解,将每个荧光光谱分解为5个基元高斯峰.讨论了各种牛奶发射光谱的规律和变化趋势,结果表明:所有牛奶水溶液的各个基元高斯峰,在相同激发波长下,其峰值位基本不变,当激发波长变化时,所有基元高斯峰会随激发波长的增加而红移;高钙低脂奶在波长较长的激发光照射下,各个基元高斯峰强度均大于纯牛奶和高钙奶;牛奶的浓度对总荧光光谱的影响较小.

关键词: 光生物学　荧光光谱　牛奶水溶液　高斯多峰拟合

Fluorescence Spectrum of Milk Solution

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Abstract:

Six kinds of samples are collected including pure milk, milk with high calcium and milk with high calcium but low fat produced by Inner Mongolia Yili Industrial Group Co.,Ltd.and Inner Mongolia Mengniu Dairy (Group) Co.,Ltd.respectively.0.17 mL, 0.20 mL, 0.23 mL, 0.26 mL, 0.29 mL, 0.32 mL, 0.35 mL of the six kinds of samples are added into 5mL deionized water, and 42 pieces of milk solution are obtained.Hitachi F-4600 fluorescence spectrophotometer is used to obtain the fluorescence spectra of the samples under excitation wavelength at 315 nm, 320 nm, 325 nm, 330 nm, 335 nm, 340 nm, 345 nm respectively.After Savitzky-Golay smoothing and FFT low-pass filtered, each fluorescence spectrum is decomposed by Gauss multi-dimensional fitting, then 5 element gauss peak appeared.Each element Gauss peak position of all milk peroxide solution is invariable under the same stimulation wave length.All element Gauss peaks are red shifted along with the stimulation wave length increasing.Under the long stimulation wave length, each element Gauss peak of milk with high calcium but low fat is bigger than the others.Milk density plays an unimportant role to the total fluorescence spectrum.

Keywords: Bio-optics　Fluorescence spectrum　Milk solution　Gauss multi-peak fitting

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