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Review Article

# Analytical Techniques for the Assay of Gadobutrol: A Review

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## Abstract

Gadobutrol is a Gadolinium-based contrast agent. Gadolinium-based MRI contrast agents have been widely used in clinical medicine for more than 30 years are all small molecule agents that distribute into all extracellular spaces in tissues without providing any specific biological information. In the present study the authors have summarised the analytical methods so far published for the estimation of Gadobutrol in the literature.

**Keywords:** Gadobutrol; MRI

## Introduction

Gadobutrol (CAS no. 138071-82-6) is a second-generation extracellular non-ionic macrocyclic Gadolinium-based contrast agent used in magnetic resonance imaging in adults and children older than 2 years of age [1,2]. Chemically, it is Gadolinium (III) 2,2',2''-(10-((2R,3S)-1,3,4-trihydroxybutan-2-yl)-1,4,7,10-tetraazacyclododecane-1,4,7-triyl) triacetate. with molecular formula $C_{18}H_{31}GdN_4O_9$ and molecular weight 604.7 grams/mole. Gadobutrol (Figure 1) is used in magnetic resonance imaging (MRI) and magnetic resonance angiography to enhance image quality and help visualize abnormal tissues and blood flow. Gadolinium-based MRI contrast agents are used in clinical medicine.

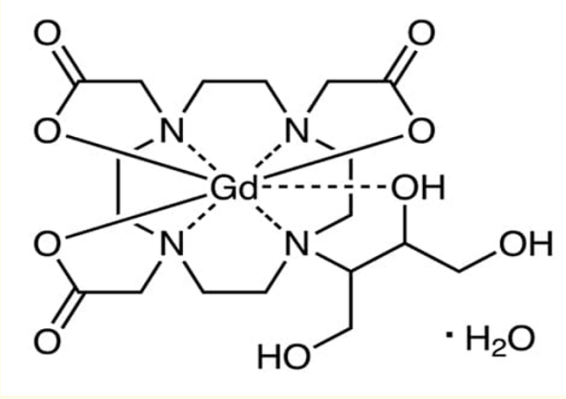


**Figure 1:** Structure of Gadobutrol ($C_{18}H_{31}GdN_4O_9$).

Ramya., *et al*. have developed RP-UPLC method [3] using a mixture of Ammonium acetate buffer and Acetonitrile (85:15) as mobile phase. Sanni Babu et al have developed two HPLC methods for the quantification of Trometamol content in Gadobutrol samples using refractive index detector [4] and also for the evaluation of Gadobutrol and its impurities [5] and the methods were summarized in Table 1.

**Table 1:** Review of analytical methods.

| Reagent/Mobile phase | Wavelength (nm) | Linearity (µg/ml) | Method | Reference |
|---|---|---|---|---|
| Ammonium acetate buffer: Acetonitrile (85:15) | 195 | | RP-UPLC | [3] |
| Phosphate buffer: Cyano methane (99:1) | - | | RP-HPLC (Refractive index detector) | [4] |
| Formic acid (pH 3.6): Acetonitrile | - | 0.8314 – 30.21 | RP-HPLC (Impurities) | [5] |

## Conclusion

This review article explains different analytical methods developed for the estimation of Gadobutrol in pharmaceutical dosage forms.

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