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# Guanidinium Thiocyanate (GITC)

Lysis buffers for nucleic acid extraction

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# Lysis Buffers to Extract Viral RNA

Guanidine thiocyanate is a potent chaotropic agent; thus, by interfering with the hydrogen bond network in aqueous solutions, it has a destabilising effect on macromolecules, especially proteins. It is commonly used in cells and the lysis processes in virus particles to extract nucleic acids, as it denatures RNase and DNase enzymes<sup>1</sup> that would otherwise damage the extract.<sup>2</sup>

GITC lysis buffers to extract viral RNA are in growing demand, linked to the use of polymerase chain reaction (PCR) based assay.

## Buffer composition (as reported by Scallan et al.<sup>3</sup>):

4 M Guanidinium thiocyanate (GITC)

55 mM\* Tris-HCl

25 mM EDTA (Ethylenediaminetetraacetic acid)

3 % (v/v) Triton X-100

0.01 % (w/v) Bromophenol blue

(\*NOTE: calculated from the total amount of 0.1 M Tris pH 7.6 added, diluted by the degree of volume expansion observed when the GITC goes into solution)

## Method to produce one litre of 4M Guanidinium thiocyanate (GITC)/ Triton X-100 Lysis buffer:

1. 472.75 g of GITC is brought into solution initially by adding 400 ml of 0.1 M Tris HCl pH 7.6. This will require heating in a 65°C water bath and some shaking of the vessel (but with lid well secured). According to scientific literature, once fully dissolved the volume of the solution was 600 ml
2. Make up to 750 ml with 0.1 M Tris HCl pH 7.6
3. Add 50 ml of 0.5 M EDTA, mix
4. Add 30 ml Triton-X-100, mix
5. Volume made up to 1 L with 0.04 % (w/v) Bromophenol blue (DEPC-treated water can be used instead)

**Note:** Always read the chemical safety data sheet associated with the chemicals and carry out a full risk assessment.

Within our Thermo Fisher Scientific Laboratory Chemicals portfolio we offer all the necessary products to prepare this lysis buffer solution with the correct specifications and in a range of convenient pack sizes. We also offer specialized custom services and can provide the products in bulk quantities if required.



Stock No.	Brand	Description	Pack size
32641-03	Alfa Aesar	Bromophenol blue, ACS	1g, 5g, 25g
A16899-09	Alfa Aesar	Bromophenol blue sodium salt	10g, 50g
38693-AE	Alfa Aesar	Bromophenol blue sodium salt, 0.04% w/v aq. soln.	100mL, 500mL
327201000	Acros Organics	EDTA, disodium salt dihydrate, 99+%, for molecular biology, DNase, RNase and protease free	100, 500g, 2.5kg
J65585-22	Alfa Aesar	Ethylenediaminetetraacetic acid, electrophoresis grade, 99.4+%	100g, 500g, 2.5kg
BP221-250	Fisher Bioreagents	Guanidine thiocyanate powder assay: $\geq 99.0\%$	250g, 1Kg
411111000	Acros Organics	Guanidine thiocyanate, 99% (argentometric titration: $\geq 98.5\%$ )	100g, 250g, 1kg
B21250-22	Alfa Aesar	Guanidine thiocyanate, 99% assay (argentometric titration: $\geq 98.5$ to $\leq 101.5\%$ )	100g, 250g, 500g
433941000	Acros Organics	Guanidine thiocyanate, for molecular biology (argentometric Titration $\geq 99.0\%$ )	100g
J65104-18	Alfa Aesar	Guanidine thiocyanate, molecular biology grade - assay (titration: 99.0% min.)	50g, 250g, 500g
423795000	Acros Organics	Hydrochloric acid, ACS reagent, ca. 37% solution in water	500mL, 2.5L
A412-212	Fisher Chemical	Hydrochloric Acid (Technical), Fisher Chemical	2.5L
BP152-1	Fisher Bioreagents	Tris Base, molecular biology grade	500g, 1kg, 5kg, 10kg, 25kg
J65594-A1	Alfa Aesar	Tris(hydroxymethyl)aminomethane, ultrapure, 99.9%	1Kg, 5Kg
J22674-36	Thermo Scientific	Tris, 99.0-101.0% (dry basis)	500g, 1kg, 5kg, 10kg, 25kg
J75825-36	Thermo Scientific	Tris, 99.8-100.1% (dry basis), molecular biology grade, ultrapure	500g, 1kg, 5kg 10kg
327371000	Acros Organics	Triton® X-100, 98%, for molecular biology, DNase, RNase and protease free	100mL, 250mL
J66624-AE	Alfa Aesar	Triton® X-100, electrophoresis reagent	100mL, 500mL, 2.5L
J65589-AP	Alfa Aesar	Water, endotoxin-free	500mL, 5L
BP2819-10	Fisher Bioreagents	Water, molecular biology grade	100mL, 1L, 4L, 10L, 20L
327390010	Acros Organics	Water, for molecular biology, DNase, RNase and Protease free	1L, 5L
J70783-AC	Thermo Scientific	Water, RNase-free, DEPC treated, molecular biology grade, ultrapure	10x1mL, 25mL, 100mL, 500mL, 1L

### Bulk and semi-bulk quantities available

Thermo Fisher Scientific is an approved supplier for several pharmaceutical organizations globally. Several products, including **Guanidinium Thiocyanate** (product codes: **41111**, **B21250**, **43394**, **J65104**) are available in bulk and semi-bulk quantities in full compliance with local regulations.

For more information [alfa.com/bulkquote](https://www.alfa.com/bulkquote)



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## References

1. McGookin R (1985) RNA extraction by the guanidine thiocyanate procedure. *Methods Mol Biol* 2:113-6.
2. Chomczynski P, Sacchi N (1987) Single-step method of RNA isolation by acid guanidinium thiocyanate-phenol-chloroform extraction. *Anal Biochem* 162(1):156-9.
3. Scallan M F, Dempsey C et al. (2020) Validation of a Lysis Buffer Containing 4 M Guanidinium Thiocyanate (GITC)/ Triton X-100 for Extraction of SARS-CoV-2 RNA for COVID-19 Testing: Comparison of Formulated Lysis Buffers Containing 4 to 6 M GITC, Roche External Lysis Buffer and Qiagen RTL Lysis Buffer. *bioRxiv* ePub: 1-6 (This article is a preprint and has not been certified by peer review)

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