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Chemicals

# 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.

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Fisher Scientific Cat. No.	Description	Pack size
11352888	Bromophenol blue, ACS	1 g, 5 g, 25 g
11468716	Bromophenol blue sodium salt	10 g, 50 g
11308967	Bromophenol blue sodium salt, 0.04% w/v aq. soln.	100 mL, 500 mL
11329886	EDTA, disodium salt dihydrate, 99+%, for molecular biology, DNase, RNase and protease free	100, 500 g, 2.5 kg
15450457	Ethylenediaminetetraacetic acid, electrophoresis grade, 99.4+%	100 g, 500 g, 2.5 kg
10503345	Guanidine thiocyanate powder assay: $\geq 99.0\%$	250 g, 1 kg
10741244	Guanidine thiocyanate, 99% (argentometric titration: $\geq 98.5\%$ )	100 g, 250 g, 1 kg
11454777	Guanidine thiocyanate, 99% assay (argentometric titration: $\geq 98.5$ to $\leq 101.5\%$ )	100 g, 250 g, 500 g
11975601	Guanidine thiocyanate, for molecular biology (argentometric Titration $\geq 99.0\%$ )	100 g
15486719	Guanidine thiocyanate, molecular biology grade - assay (titration: 99.0% min.)	50 g, 250 g, 500 g
10790872	Hydrochloric acid, ACS reagent, ca. 37% solution in water	500 mL, 2.5 L
11463443	Hydrochloric Acid (Technical), Fisher Chemical	2.5 L
10163243	Tris Base, molecular biology grade	500 g, 1 kg, 5 kg, 10 kg, 25 kg
15446989	Tris(hydroxymethyl)aminomethane, ultrapure, 99.9%	1 kg, 5 kg
15855348	Tris, 99.0-101.0% (dry basis)	500 g, 1 kg, 5 kg, 10 kg, 25 kg
15845368	Tris, 99.8-100.1% (dry basis), molecular biology grade, ultrapure	500 g, 1 kg, 5 kg, 10 kg
10671652	Triton™ X-100, 98%, for molecular biology, DNase, RNase and protease free	100 mL, 250 mL
15428059	Triton™ X-100, electrophoresis reagent	100 mL, 500 mL, 2.5 L
15456979	Water, endotoxin-free	500 mL, 5 L
10505854	Water, molecular biology grade	100 mL, 1 L, 4 L, 10 L, 20 L
10191231	Water, for molecular biology, DNase, RNase and Protease free	1 L, 5 L
15805408	Water, RNase-free, DEPC treated, molecular biology grade, ultrapure	10 x 1 mL, 25 mL, 100 mL, 500 mL, 1 L

## 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.

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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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