KAPABIOSYSTEMS
evolving better science

ATCGGCA TTTGGCC CGCATCG GACTACG NGS | qPCR | PCR

KAPA PROBE FORCE

Evolved to break through.

KAPA PROBE FORCE is our most inhibitor–resistant qPCR master mix that removes the need for DNA purification, enabling streamlined sample-to-C_q workflows. The master mix contains a third generation DNA polymerase evolved to overcome blood, tissue, and plant PCR inhibitors. Crude samples can now be analyzed with comparable accuracy, reproducibility, and sensitivity as purified DNA using KAPA PROBE FORCE.

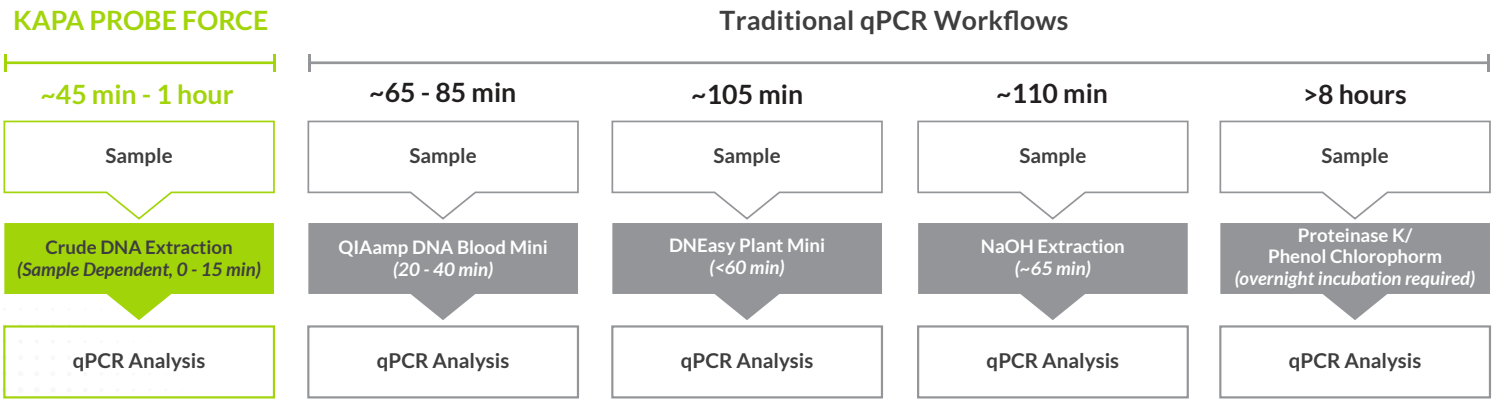
Benefits include:

- direct qPCR from crude blood, tissue, and plant extracts
- sample-to-C_q workflows in <1 hour
- high efficiency for accurate, reproducible, and sensitive results
- superior tolerance to carry-over inhibitors
- multiplex compatibility with crude extracts

Streamline Sample-to-C_q Workflows

KAPA PROBE FORCE enables the use of rapid crude DNA extraction methods and overcomes carry-over inhibitors. Competing master mixes used in traditional blood, tissue, and plant qPCR workflows require robust upstream sample processing (e.g. column purification or nuclease digestion).

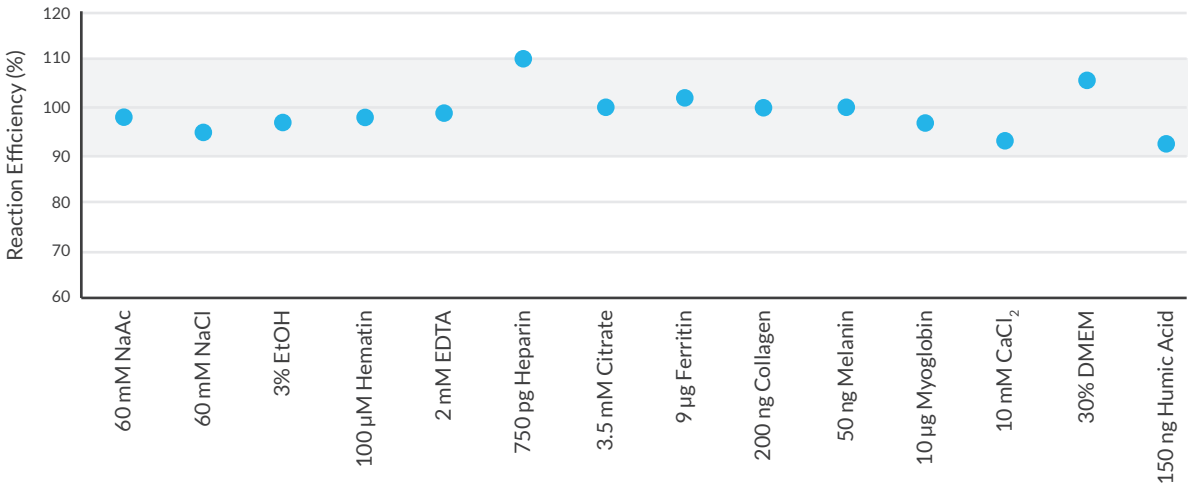
- Eliminate the time and cost of sample purification by amplifying directly from crude samples
- Analyze a wide range of sample types including whole blood, cells, mouse tails, FFPE, leaf, stem, seed, and soil



Generate Accurate and Reproducible Results

- Kits include a third-generation DNA polymerase, evolved for robust target amplification and detection
- Enzyme maintains high reaction efficiency in the presence of PCR inhibitors for reliable data generation

Reaction Efficiency with Inhibited Samples



High efficiency target amplification. Reaction efficiencies achieved for inhibitor spiked samples were examined and compared to that of purified DNA. Across various inhibitor types, efficiencies remained within 90 - 110%.

Break Through High Levels of qPCR Inhibitors

KAPA PROBE FORCE exhibits consistent and robust amplification across all inhibitors tested, without observable C_q delays.

- Achieve greater levels of sensitivity for inhibited blood, tissue, and plant samples
- Convert purified DNA assays to crude workflows without observable C_q delays

Purified vs. Inhibited Sample ΔC_q

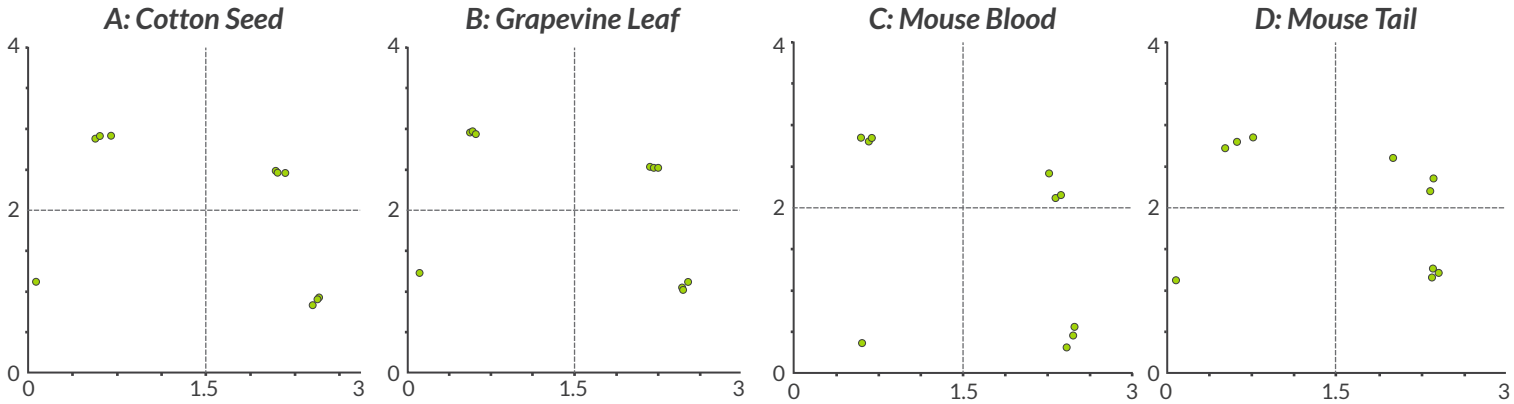
		PROBE FORCE	Competitor 1	Competitor 2	Competitor 3	Competitor 4	Competitor 5
100 pg human gDNA		29.62	28.91	29.08	32.98	29.53	29.78
Blood Inhibitors	Citrate (3.5 mM)	-0.04	2.64	-0.18	0.98	0.20	2.90
	EDTA (2 mM)	0.26	0.29	0.24	-0.35	0.80	1.07
	Ferritin (9 µg /10 µL)	-0.33	0.50	0.48	10 ng	NA	NA
	Hematin (100 µM)	0.99	0.29	0.75	NA	NA	NA
	Heparin (750 pg /10 µL)	-0.23	0.67	1.14	-0.02	0.53	3.77
100 pg mouse gDNA		29.56	29.17	28.78	32.40	29.13	29.15
Tissue Inhibitors	Collagen (200 ng /10 µL)	-0.41	0.63	-0.02	1.40	0.21	0.69
	Myoglobin (10 µg /10 µL)	0.18	1.59	4.84	-1.65	3.47	1.97
	Melanin (50 ng /10 µL)	-0.09	0.73	0.97	NA	NA	NA
	$CaCl_2$ (10 mM)	0.03	100 ng	100 ng	NA	100 ng	NA
	DMEM (30%)	-0.72	NA	NA	NA	NA	NA
40 pg grapevine gDNA		33.79	33.85	33.70	34.29	33.05	40.78
Plant Inhibitors	Polyphenols (7%)	1.02	0.10	0.47	3.01	0.98	1 ng
	Humic Acid (150 ng /10 µL)	0.76	0.52	0.70	NA	NA	NA
20 fg purified *E. coli* gDNA		31.18	30.75	31.16	35.90	31.22	44.80
Extraction Inhibitors	Ethanol (3%)	-0.03	0.56	-0.41	20 pg	-0.23	NA
	NaAc (60 mM)	0.42	1.27	20 pg	-4.15	NA	NA
	NaCl (60 mM)	0.14	NA	200 pg	20 pg	NA	NA

<1 ΔC_q | 1 - 2 ΔC_q | 2 - 3 ΔC_q | >3 ΔC_q | • Detection failed. Lowest concentration at which C_q < 45 cycles detected or No Amplification (NA).

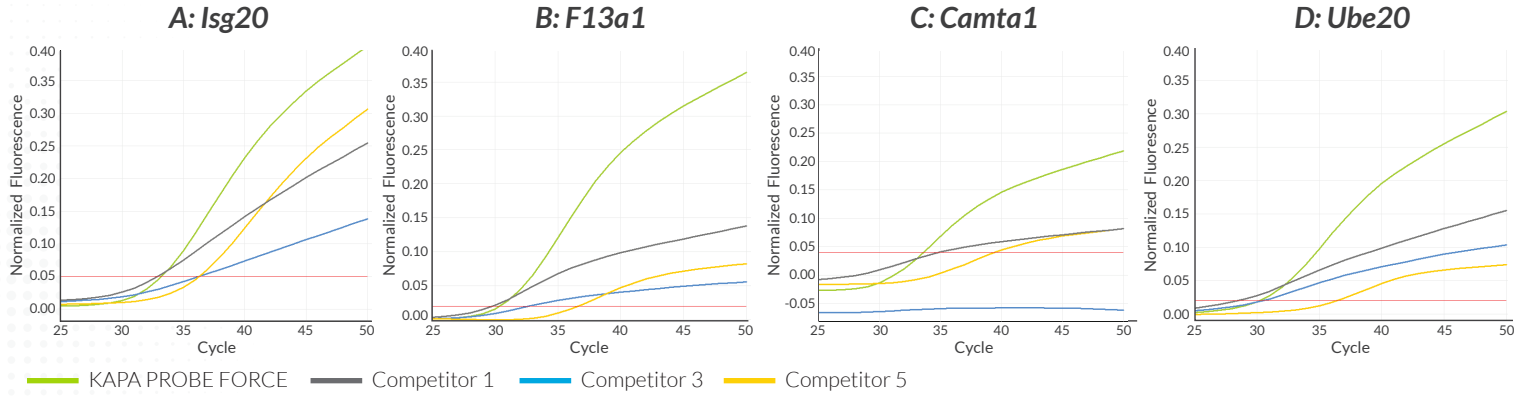
Broad range of high inhibitor resistance. Baseline performance of KAPA PROBE FORCE and competing master mixes was measured by creating standard curves with purified DNA according to each manufacturer's recommended cycling conditions. Serial dilutions were run in the following ranges: Human: 100 ng – 10 pg; Mouse: 100 ng – 10 pg; Plant: 25 ng – 8 pg; and Bacteria: 2 ng – 2 fg. Inhibitors were individually spiked into purified DNA samples at high concentrations to determine their effect on C_q values.

Multiplex Crude Samples Efficiently

- Accelerate genotyping analysis with single reaction allelic discrimination of crude DNA extracts
- Maximize data collection from precious samples, increase throughput, and reduce costs



Crude sample duplex SNP detection. KAPA PROBE FORCE provides accurate genotyping and tight clustering in the presence of crude extracts **(A)** cotton seed, 0.5M NaOH extraction; **(B)** grapevine leaf, 75 mM Tris-HCl and 5 mM TCEP extraction; **(C)** mouse blood, FTA 0.5 mm disc; and **(D)** mouse tail extracts, NaOH extraction, for rapid SNP analysis.



Highly efficient 4-plex performance. Four targets were amplified in a multiplex assay with KAPA PROBE FORCE and three competitive master mixes. 100 pg mouse gDNA was amplified targeting the **(A)** Isg20 (FAM/BHQ-1), **(B)** F13a1 (CAL Fluor Orange 560), **(C)** Camtal (Quasar 670) and **(D)** Ube20 (Quasar 705) genes. 500 nM primers and 110 nM probes were used with the following cycling conditions: 95°C for 30 sec followed by 50 cycles of 95°C for 3 sec, and 60°C for 30 sec.

Ordering Information

Kit Code	Description	Kit Size
KK4300	KAPA PROBE FORCE qPCR Master Mix (2X) Universal	1 mL
KK4301	KAPA PROBE FORCE qPCR Master Mix (2X) Universal	5 mL
KK4302	KAPA PROBE FORCE qPCR Master Mix (2X) Universal	10 mL
KK4303	KAPA PROBE FORCE qPCR Master Mix (2X) Universal	50 mL

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