SHENTEK

Residual Vero DNA Size Analysis Kit (2G) User Guide

Version: A/1
For Research Use Only
Product No.: 1103174
Reagents for 4×100 Reactions

Huzhou Shenke Biotechnology Co., Ltd

(IMPORTANT: Please read this document carefully before experiment.)

1. Product information

■ Product description

SHENTEK® Residual Vero DNA Size Analysis Kit (2G) is used to quantitate Vero DNA residues of different fragment sizes for various stages of biopharmaceutical products, from in-process samples to final products.

This kit utilizes real-time PCR technology to perform rapid and specific quantitation of residual Vero DNA fragments in samples. It is designed to amplify four different fragments (85bp, 134bp, 229bp, 552bp) for the accurate determination of their size distribution at the femtogram (fg) level. For extraction information, please refer to the SHENTEK® Residual Host Cell DNA Sample Preparation Kit User Guide (Product No. 1104191).

■ Kit contents and storage

WARNING: Please read the Material Safety Data Sheets (MSDSs) and follow the handling instructions. Wear appropriate protective eyewear, mask, clothing and gloves.

Table 1. Kit component and storage

Reagent	Part No.	Quantity	Storage
qPCR Reaction Buffer	NNB001	850 µL × 8 tubes	-20℃, protect from light
Vero Primer&Probe MIX-85	NNC020	300 µL × 1 tube	
Vero Primer&Probe MIX-134	NNC021	300 µL × 1 tube	
Vero Primer&Probe MIX-229	NNC022	300 µL × 1 tube	
Vero Primer&Probe MIX-552	NNC023	300 µL × 1 tube	
IPC MIX	NNC069	550 µL × 1 tube	
DNA Dilution Buffer (DDB)	NND001	1.5 mL × 3 tubes	-20℃
Vero DNA Control	NNA010	50 µL × 1 tube	

The kit components can be stored at appropriate conditions for up to 24 months. Please check the expiration date on the labels.

■ Applied instruments, including but not limited to the following

- SHENTEK-96S Real-Time PCR System
- 7500 Real-Time PCR System
- CFX96 Real-Time PCR System
- LineGene 9600plus Real-Time PCR System

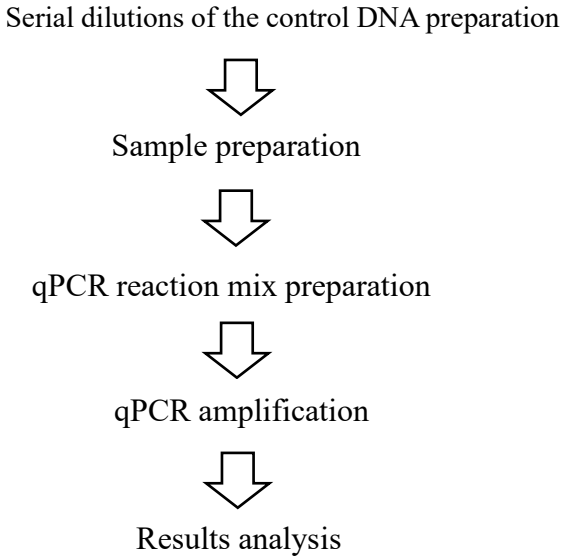
■ Required materials not included in the kit

- Nonstick, DNase-free & Low Retention Microfuge Tubes, 1.5 mL
- Nonstick, Low Retention Tips, 1000 μL, 100 μL and 10 μL
- 96-well qPCR plates or PCR 8-strip tubes

■ Related equipment

- Real-Time PCR system
- Vortex mixer
- Microplate shaker
- Micropipettes: 1000 μL, 100 μL and 10 μL

■ Workflow



2. Methods

■ Experiment preparation

1. Wear appropriate protective eyewear, mask, clothing and gloves.
2. Irradiate the tabletop, pipettes and tubes with UV for 30 minutes, and disinfect with 75% ethanol.
3. Thaw the kit completely at 2-8°C or melt on ice, vortex and spin briefly.

■ DNA Control serial dilutions for the standard curve

Note: The kit contains four Vero primer & probe mixes for different fragment lengths. Please set up four separate standard curves corresponding to each specific fragment length.

Please check the concentration on the label of the tube containing the Vero DNA Control prior to dilution.

Prepare a series of Vero DNA Control solution with DNA Dilution Buffer (DDB) and follow the serial dilution procedure below:

1. Thaw Vero DNA Control and DNA Dilution Buffer completely at 2-8°C or melt on ice. Vortex to mix well and quickly spin down the reagents for 3-5 seconds in microcentrifuge, and repeat 3 times.
2. Label six nonstick 1.5 mL centrifuge tubes: ST0, ST1, ST2, ST3, ST4, ST5 respectively.
3. Dilute the DNA Control to 3000 pg/μL with DDB in the ST0 tube. Vortex to mix well and quickly spin down the reagents for 3-5 seconds in microcentrifuge, and repeat 3 times to mix it thoroughly.
4. Add 180 μL DDB to each tube: ST1, ST2, ST3, ST4, ST5.
5. Perform the serial dilutions:

Table 2. Dilution for Vero DNA Control

Serial dilution tube	Dilution	Conc. (pg/μL)
ST0	Dilute the DNA Control with DDB	3000
ST1	20 μL ST0 + 180 μL DDB	300
ST2	20 μL ST1 + 180 μL DDB	30
ST3	20 μL ST2 + 180 μL DDB	3
ST4	20 μL ST3 + 180 μL DDB	0.3
ST5	20 μL ST4 + 180 μL DDB	0.03

- *The remaining unused DDB need to be stored at 2-8℃. If the solution is cloudy or contains precipitates, heat at 37℃ until it clears.*
- *At least five concentration of standard curve should be included. To select appropriate sample dilutions, we recommend to perform method validation before sample testing.*

■ sample preparation

Add 100 μL DDB into a 1.5 mL clean centrifuge tube and label it as NCS.

NCS and samples are prepared in same way.

■ qPCR MIX preparation

1. Determine the number of reaction wells based on the standard curve, with the number of test samples and control samples. Generally, triplicates are tested for each sample.

   Number of reaction wells = (5 standard points on the standard curve + 1 NTC + 1 NCS + test samples)×3

2. Prepare qPCR MIX according to the number of reaction wells:

Table 3. qPCR MIX-85 Preparation

Reagents	**Volume/reaction**	**Volume for 30 reaction (includes 10% overage)**
qPCR Reaction Buffer	15.9 μL	524.7 μL
Vero Primer&Probe MIX-85	2.8 μL	92.4 μL
IPC MIX	1.3 μL	42.9 μL
Total volume	20 μL	660 μL

Table 4. qPCR MIX-134 Preparation

Reagents	**Volume/reaction**	**Volume for 30 reaction (includes 10% overage)**
qPCR Reaction Buffer	15.9 μL	524.7 μL
Vero Primer&Probe MIX-134	2.8 μL	92.4 μL
IPC MIX	1.3 μL	42.9 μL
Total volume	20 μL	660 μL

Table 5. qPCR MIX-229 Preparation

Reagents	**Volume/reaction**	**Volume for 30 reaction (includes 10% overage)**
qPCR Reaction Buffer	15.9 μL	524.7 μL
Vero Primer&Probe MIX-229	2.8 μL	92.4 μL
IPC MIX	1.3 μL	42.9 μL
Total volume	20 μL	660 μL

Table 6. qPCR MIX-552 Preparation

Reagents	**Volume/reaction**	**Volume for 30 reaction (includes 10% overage)**
qPCR Reaction Buffer	15.9 μL	524.7 μL
Vero Primer&Probe MIX-552	2.8 μL	92.4 μL
IPC MIX	1.3 μL	42.9 μL
Total volume	20 μL	660 μL

For simultaneous detection of the four fragments, please prepare at least 120 μL DNA template for four assays.

■ qPCR Reaction MIX preparation

1. Prepare qPCR Reaction MIX according to Table 7-10 and 96-well plates layout as shown in Table 11.

Table 7. qPCR Reaction MIX-85 Preparation

ST-85	20 μL qPCR MIX-85 + 10 μL ST1/ST2/ST3/ST4/ ST5
NTC	20 μL qPCR MIX-85 + 10 μL DDB
NCS	20 μL qPCR MIX-85 + 10 μL purified NCS
Test sample	20 μL qPCR MIX-85 + 10 μL purified test sample

Table 8. qPCR Reaction MIX-134 Preparation

ST-134	20 μL qPCR MIX-134 + 10 μL ST1/ST2/ST3/ST4/ ST5
NTC	20 μL qPCR MIX-134 + 10 μL DDB
NCS	20 μL qPCR MIX-134 + 10 μL purified NCS
Test sample	20 μL qPCR MIX-134 + 10 μL purified test sample

Table 9. qPCR Reaction MIX-229 Preparation

ST-229	20 μL qPCR MIX-229 + 10 μL ST1/ST2/ST3/ST4/ ST5
NTC	20 μL qPCR MIX-229 + 10 μL DDB
NCS	20 μL qPCR MIX-229 + 10 μL purified NCS
Test sample	20 μL qPCR MIX-229 + 10 μL purified test sample

Table 10. qPCR Reaction MIX-552 Preparation

ST-552	20 μL qPCR MIX-552 + 10 μL ST1/ST2/ST3/ST4/ ST5
NTC	20 μL qPCR MIX-552 + 10 μL DDB
NCS	20 μL qPCR MIX-552 + 10 μL purified NCS
Test sample	20 μL qPCR MIX-552 + 10 μL purified test sample

Table 11. Example of 96-well plate layout

MIX-85			MIX-134			MIX-229			MIX-552			
NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	NTC	A
NCS	NCS	NCS	NCS	NCS	NCS	NCS	NCS	NCS	NCS	NCS	NCS	B
S	S	S	S	S	S	S	S	S	S	S	S	C
ST5	ST5	ST5	ST5	ST5	ST5	ST5	ST5	ST5	ST5	ST5	ST5	D
ST4	ST4	ST4	ST4	ST4	ST4	ST4	ST4	ST4	ST4	ST4	ST4	E
ST3	ST3	ST3	ST3	ST3	ST3	ST3	ST3	ST3	ST3	ST3	ST3	F
ST2	ST2	ST2	ST2	ST2	ST2	ST2	ST2	ST2	ST2	ST2	ST2	G
ST1	ST1	ST1	ST1	ST1	ST1	ST1	ST1	ST1	ST1	ST1	ST1	H
1	2	3	4	5	6	7	8	9	10	11	12	

- *This example represents four assays, each for standard curve points of Vero DNA Control (ST1-ST5),1 NTC,1 NCS, 1 test sample and 3 replicates for each sample.*
- *In specific testing, the plate layout for sample loading can be adjusted based on the sample quantity. Please refer to the example shown in Table 11.*

2. Seal the 96-well plate with sealing film. Mix it well in microplate shaker, then spin down the reagents for 10 seconds in centrifuge and place it in the qPCR instrument.

■ qPCR program setting

Note: The following instructions apply only to the 7500 instrument(passive reference dye ROX included) with SDS v1.4. If you use a different instrument or software, refer to the applicable instrument or software documentation.

1. Create a new document, then in the Assay drop-down list, select **Standard Curve (Absolute Quantitation)**.

2. Click **New Detector**, then enter Vero-85 in the Name field, select **FAM** in the Reporter Dye drop-down list and select **(none)** in the Quencher Dye drop-down list, then click **OK**.

3. Create new detector for Vero-134, Vero-229 and Vero-552, separately as step 2.

4. Click **New Detector**, then enter IPC in the Name field. Select **VIC** in the

Reporter Dye drop-down list and select **(none)** in the Quencher Dye drop-down list, then click **OK**.

5. Select **ROX** as the passive reference dye, then Click **Next**.

6. Select the applicable set of wells for the samples, then select the corresponding detector for each well.

7. Select Finish, and then set thermal-cycling conditions:

a. Set the thermal cycling reaction volume to 30 μL.

b. Set the temperature and the time as following:

Table 12. qPCR running temperature and time

Step	Temp.	Time(mm:sec)	Cycles
Activation	95℃	10:00	1
Denaturation	95℃	00:15	40
Annealing	60℃	00:30	
Extension	72℃*	01:30	

*Instrument will read the fluorescence signal during this step.

8. Save the document, then click **Start** to start the real-time qPCR run.

■ Results analysis

1. Select **Set up** tab, then set tasks for each sample type by clicking on the Task Column drop-down list:

a. NTC: target DNA detector task = **NTC**

b. NCS, test samples: target DNA detector task= **Unknown**

2. Set up the standard curve as shown in the following table:

Table 13. Settings for Standard curve

Tube label	Task	Quantity (pg/μL)
ST1	Standard	300
ST2	Standard	30
ST3	Standard	3
ST4	Standard	0.3
ST5	Standard	0.03

3. Select the **Results** tab, then select Amplification Plot.

4. In the Data drop-down list, select **Delta Rn vs Cycle**.
5. In the Analysis Settings window, enter the following settings:
   a. Select **Manual Ct**.
   b. In the Threshold field, suggest enter 0.02.
   c. Select **Automatic Baseline**.
6. Click the button ▶ in the toolbar, then wait the plate analyzing.
7. Select the **Result** tab**> >Standard curve** tab, then verify the Slope, Intercept and R^2 values.
8. Select the Report tab, then achieve the mean quantity and standard deviation for each sample.
9. Select **File > > Export > > Results**. In the Save as type drop-down list, select **Results Export Files**, then click **Save**.
10. Set the DNA size of 85 to be 100%, calculate the percentage of the DNA size of 134, 229 and 552.
11. Analyze the Ct value of IPC. Normally, the Ct-IPC value of the sample should be within ±1.0 of the NCS Ct-IPC value. If the Ct-IPC value of the sample is significantly higher than the Ct-IPC value of the NCS, it indicates that the sample may be inhibited. It is recommended testing the ERC samples at the same time, and take the sample recovery rate result as the criterion.
12. The results of NTC should be 2 larger than the mean Ct value of the lowest concentration in the standard curve, or specific criteria should be set according to the laboratory's verification results. The Ct value of NCS should be larger than the mean Ct value of the lowest concentration in the standard curve. If the proven limit of quantification concentration is lower than the minimum concentration of the standard curve, the detected value of NCS should be less than the limit of quantification concentration.

Note: The parameter settings of the result analysis should be based on the specific model and the software version, and generally can also be automatically interpreted by the instrument.

Effective date: 08 Jul. 2024

Support & Contact

Huzhou Shenke Biotechnology Co., Ltd.
www.shentekbio.com
Address: 8th Floor, 6B Building, No.1366 Hongfeng Road, Huzhou313000, Zhejiang Province, China
E-mail: info@shentekbio.com
Phone: +1 (908) 822-3199 / (+86) 400-878-2189